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RESISTANCE TESTS OF A SYSTEMATIC SERIES OF PARTIALLY AIR SUPPORTED VEHICLES

by

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NOTATION

A	Area of bottom in feet^2
AHP	Air horsepower required to support craft, (see Equation (1))
b	Beam, excluding side keels, in feet
D_E	Total effective resistance in pounds (see Equation (4))
EHP	Effective horsepower, RV/550
F	Froude number based on constant area, $V/\sqrt{gA^{1/2}}$
g	Acceleration due to gravity, feet per second^2
L	Lift, equals displacement in pounds (gross weight)
l	Length of hull bottom in feet
R	Resistance in pounds
THP	Total horsepower (EHP + AHP)
V	Speed in feet/second
$\delta\tau$	Change of trim in degrees, positive bow up
∇	Volume of displacement in feet^3, $L/\rho g$
ρ	Water density, pound-second^2/feet^4

ABSTRACT

Four partial air support (Hydrokeel) vehicles of different length-beam ratio have been tested for resistance at a number of loads, speeds, and trim conditions. All data are presented in nondimensional form for use in comparing hull forms.

The tests showed that the use of an air support system significantly improves the performance of this configuration. Lift-drag ratios greater than ten were obtained for a wide range of conditions. Wetted boundaries were not discernible, nor could planing lift be deduced, due to the complexity of the flow.

ADMINISTRATIVE INFORMATION

This study was authorized by Bureau of Ships letter F0140202, Serial 449-6 of 23 March 1964. Funding was under S-F014 02 02, Task 2065. Program was under cognizance of BUSHIPS Code 449.

INTRODUCTION

Early attempts at air lubrication were unsuccessful because of difficulty in maintaining a stable layer of air between the ship and the water. The advent of the air cushion concept (i.e., use of a nearly static cushion of air below the undersurface of the vehicle) marked the beginning of investigations of possible efficient means of reducing skin friction. At the present time various methods have

been tried to seal the periphery of the air cushion vehicle. The basic aim in each case is to retain a rather large cushion of air underneath. The Ground Effect Machine "GEM" uses an air curtain as a seal. The "Captured Air Bubble Vehicle" has immersed side keels and a forward and aft "ski" (adjustable movable planing surface) for end seals. The "Hydrokeel" vehicle has immersed side keels, a flexible flap for a forward seal, and the flat after portion of the bottom for a rear seal.

The various configurations differ in the degree of complexity of the seals, the amount of drag incurred by the seals, and the amount of air leakage allowed. Mechanical seals are likely to reduce air leakage at the expense of larger propulsive requirements to overcome the drag of the seals. However, for high density configurations requiring a large pressure under the vehicle, mechanical seals appear to be advantageous. Also, at small Froude number, such as would be associated with very large vehicles or low speed (e.g., near "hovering") it has been generally accepted that mechanical seals are more efficient than an air curtain. Operation at low speed is an important consideration since for many Navy applications the ability to operate at high speed must be combined with the ability to cruise efficiently at low and intermediate speeds. The hydrokeel configuration is of particular interest because of the simplicity of its mechanical seals.

Studies have been made and are continuing to be made of the Ground Effect Machine and Captured Air Bubble Vehicle. Little information is presently available, however, with regard to the Hydrokeel Vehicle. To obtain data necessary for an evaluation of the concept, the Bureau of Ships requested the David Taylor Model Basin to test a systematic series of hydrokeel boats. The testing of a systematic series of hull forms serves a number of useful purposes: (1) the data obtained can be used to predict the performance of projected new designs, (2) the results indicate the effects on performance of changes in the design variables, (3) the results indicate the values of parameters which are optimum, and (4) the results indicate the practicability of the configurations by comparing efficiency with other designs.

The hydrokeel is a radical departure from conventional design and is inherently complex because it involves both hydrodynamic and aerodynamic flows. The number of variables open to investigation is therefore large and it was necessary, in order to keep the investigation within practical limits, to test very simple models and limit the measurements to basic quantities. Based on previous planing data, there was reason to suspect that the influence of length, beam, displacement, and static trim (LCG location) would be of primary importance. As a result of preliminary tests it was found necessary also to include as a variable the mass flow of air required to maintain the air cushion. The parent configuration is

the simplest possible, a rectangular box. Four models having length-to-beam ratios of 2.5, 4.0, 5.5, and 7.0 were tested. Results are presented in the form of curves of lift-drag ratios versus area coefficients at specific Froude numbers for optimum air flow.

DESCRIPTION OF MODELS

Lines and principal characteristics of the models are shown in Figure 1. The models were simple rectangular shells, made of 1/4 in. plywood. Air ducting and plenum chambers were located on each model. The air was supplied by two mechanically interconnected centrifugal fans driven by two 8.5 hp electric motors. The air discharged into two noncommunicating plenum chambers. It then passed through the ducts on either side of the craft and exited under the hull just aft of the bow flaps. Hinged flexible flaps at the bow, made of 3/32 in. thick rubber, and two deep keels at the sides provided a seal to prevent gross loss of air, thus reducing the blower requirements. The seal at the stern was provided by the after portion of the bottom planing in the water. A deep center keel separated the port and starboard air systems to provide transverse stability.

The four models are shown in planview in Figure 2. It can be seen the values of length-beam ratio tested in the series are 2.5, 4.0, 5.5, and 7.0. The extreme models are outside the

generally accepted range of boat proportions but one of the purposes of this systematic series is to investigate unfamiliar ground. The bottom area for the four hulls is the same. Essentially the four models were derived by adjusting the station spacing and the beam to give the different length-beam ratios desired. The model with the length-beam ratio of 4.0 had proportions similar to those of an experimental LCVP(K), a high speed landing craft. On each model, scales were marked along the keels and on one side of the transom for reading solid-water wetted lengths. Photographs of one of the models are shown in Figure 3.

TEST SETUP AND INSTRUMENTATION

Langley Tank 1, in which the models were towed is described in Reference 1*. Each model was towed on a thrust line which was parallel with the hull bottom and 18.5 in. above it, and an automatic towing system maintained the shaft line by raising and lowering the towing arm to follow the model. The model was free to pitch, heave, and roll. It was restrained in yaw by slotted guides which engaged vertical posts fixed to the model near the bow and stern. The resistance was measured with a differential reluctance modular force gage. Rise and trim data were obtained by use of a pulley and string mechanism that made possible the measurement of rise

*References are listed on page 65.

at the bow (positive upward) and drop at the stern (positive downward) relative to the static position. The trim change from the static position was computed from the bow rise and stern drop.

Air flow was determined by means of a Hastings heated thermopile air meter fitted in each duct. Static tubes in each duct were used to measure the static pressure. A velocity profile of the flow in the ducts was taken prior to testing. The same relative distribution of air in the ductwork was found to exist for all the models.

All data were recorded on an oscillograph and on a digital data recording system. Motion and still pictures were taken.

TEST PROGRAM

The present series was planned so as to explore in a systematic way the effects of a wide variation of length-beam ratios, hull trims, and loads. The bottom area of the series of hulls is the same; therefore, if the hulls are compared on the basis of equal $A/\nabla^{2/3}$, the comparison will be on the basis of equal values of hull area and hull volume. The values of $A/\nabla^{2/3}$ planned were 13.0, 7.5, and 5.0; however, with Model 4985, it was found necessary to omit $A/\nabla^{2/3} = 13.0$ due to spray problems, and to include $A/\nabla^{2/3} = 6.4$ to properly define trends.

The static trim conditions were -0.5, 0, 0.5, 1.0, and 1.5

deg, positive bow up, referred to the hull bottom. The speed range was from 5 fps to 35 fps (F equals about 0.3 up to F equals 2.4). After a few preliminary runs, it was found that the quantity of air pumped under the hull had an important effect on resistance. Various air mass flow rates were then added to the test program to define this effect.

RESULTS AND DISCUSSION

FLOW AND STABILITY

In general, the models were stable throughout the ranges of loads and speeds tested, the only exception being the hull with length-beam ratio of 7.0 at $A/\nabla^{2/3} = 7.5$ which exhibited a slight vertical instability at F above 2.0.

Underwater photographs of the models showed that the air support chamber contained a mixture of air and water. It was impossible to see through the mixture to determine wetted boundaries. The models were apparently partially supported by planing on this mixture, but the amount of planing lift was not deducible. It was impossible also to determine the wetted area of the center keel and inside surfaces of the side keel.

A leakage of air at the front seals generated a fine mist (see Figure 4) which engulfed the models. Tests of the model with length-beam ratio of 7.0 at light loads were prevented by the danger of excessive spray wetting the towing carriage

electrical equipment. Without air blowing, large quantities of spray were generated at the bow and forefoot of the side keels at high speeds, limiting tests at these conditions as well.

The models retained the air sufficiently well to be considered air-cushion vehicles over the range of static trims from -0.5 to 1.5 deg. At 2.0 deg and above, however, the forefoot of the side keel was apparently insufficiently deep to maintain an adequate seal and the blowers had little effect. At -1.0 deg the buoyant and dynamic forces of the water seated the flap against the air duct exit, preventing the flow of air. The models failed to retain the air in the hovering condition. They would usually list to one side and air would escape from under the side keel. Also, model-generated disturbances were reflected back from the tank walls causing the model to roll.

QUANTITATIVE RESULTS

Values of speed, resistance, air flow, air pressure, bow rise, stern drop, and trim change from the tests of the four models are given in Table 1. The air drag of the towing gear has been subtracted from the measured resistance values.

Figure 5 shows the effect of air support on resistance for a typical model condition. It can be seen that air flow has a marked influence on the performance of a hull of this design. It should be remembered that such a hull with three

deep keels is significantly poorer without air support than a conventional hull. An air flow rate which was considered optimum was determined for each trim, load, and speed condition. The optimum air flow rate was chosen as that beyond which the reduction in resistance was judged to be insufficient to warrant the additional power requirements. Figure 5 indicates the points chosen as optimum for a number of model speeds at a specific load and trim condition. Although the method of determining the optimum was admittedly somewhat arbitrary, in most instances (particularly the intermediate speeds) the sharpness of the bend in the curves limited the choice to a narrow range.

In order to give a realistic indication of the total power requirements and facilitate comparisons, the resistance equivalent of the power required to support the weight of the craft is calculated for the optimum air flow. This value, combined with the measured hull resistance, determines the total effective resistance which is called D_E. The equations used to obtain D_E are as follows:

$$\text{AHP} = \text{Air Velocity (fpm)} \times \text{Area Duct (sq ft)} \times \text{Pressure in Duct (psi)} \times \frac{144}{33,000} \qquad (1)$$

$$\text{EHP} = \frac{RV}{550} \qquad (2)$$

$$\text{THP} = \text{AHP} + \text{EHP} \qquad (3)$$

$$D_E = \frac{550\ \text{THP}}{V} \qquad (4)$$

Values of L/D_E versus $A/\nabla^{2/3}$ corresponding to optimum air flow conditions as determined from faired data such as that presented in Figure 5, are presented in Figure 6 for various Froude numbers and static trims. It is notable that a lift-drag ratio of ten is exceeded for wide ranges of the test conditions. In view of the simplicity of the configurations tested, further development and refinement of the design could be expected to result in even larger lift-drag ratios and wider ranges of operating conditions.

COMPARISON OF MODELS

Using Figure 6, comparisons may be made of the four models at various angles of static trim and at specific Froude numbers. At Froude numbers of 1.4 or less and heavy loads the model with the highest length-beam ratio has quite a low drag (high L/D_E). However, the data do not cover the full range of loads because of excessive spray at light loads as previously explained. As the speed increases, for Froude numbers of 1.6 or more and trim between -0.5 and 0.5, the smallest length-beam ratio shows superior performance as is to be expected because of the superior efficiency of a high aspect ratio dynamic lifting surface and smaller skin friction of the shorter keels.

CONCLUDING REMARKS

The use of an air support system significantly improves the

performance of this configuration. Lift-drag ratios greater than ten were obtained for a wide range of conditions. High lift-drag ratios were obtained with large loads at low speeds with the longest model ($l/b = 7.0$) and at high speeds with the shortest model ($l/b = 2.5$). The air support chamber contained a mixture of air and water when planing and wetted boundaries were not discernible, nor could planing lift be deduced due to the complexity of the flow. The models were trim-sensitive and could only be tested through a trim range of -0.5 through 1.5 deg. The models were stable except for the zero speed condition and a slight instability of the longest model over a narrow operating range.

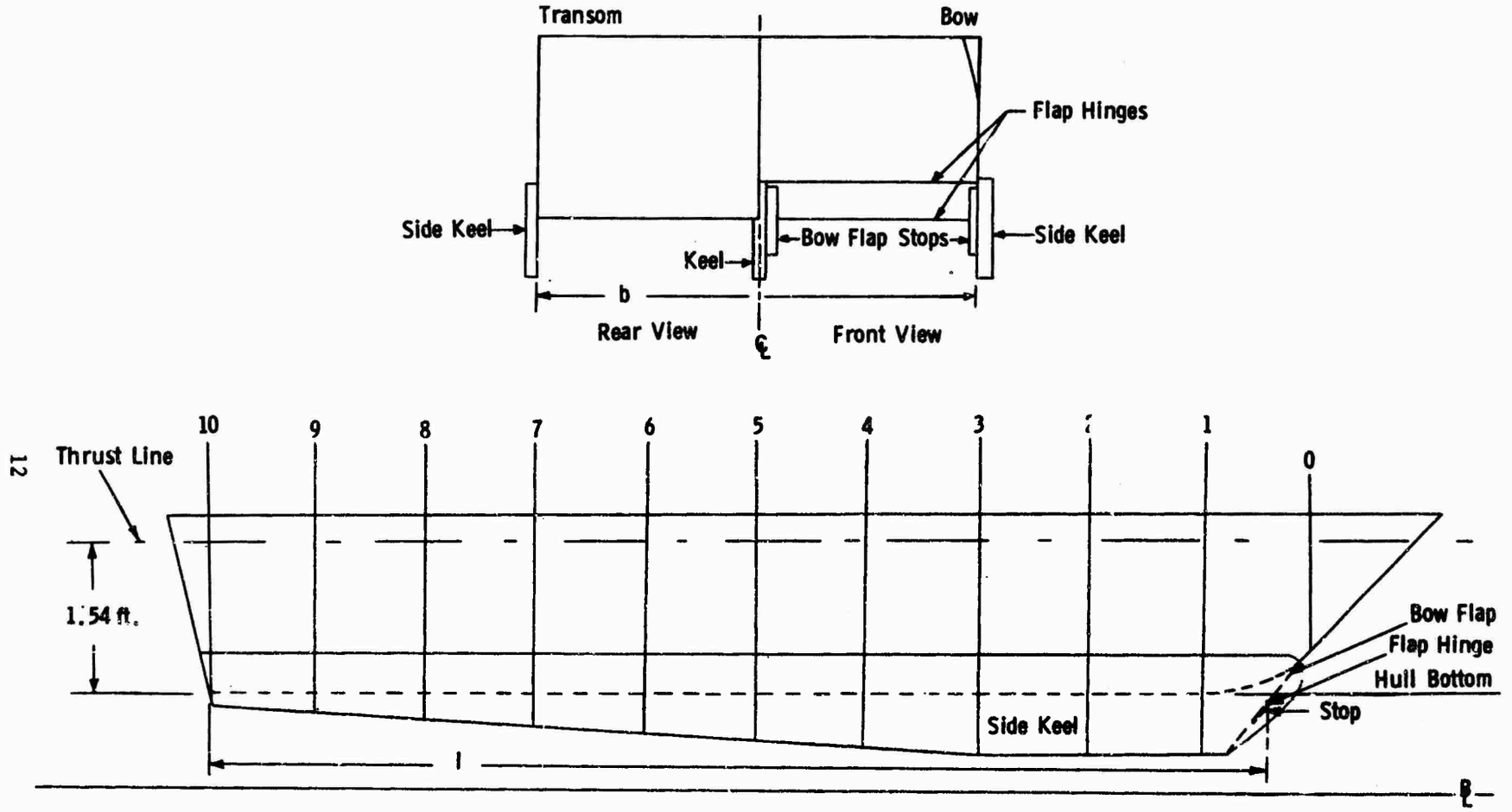
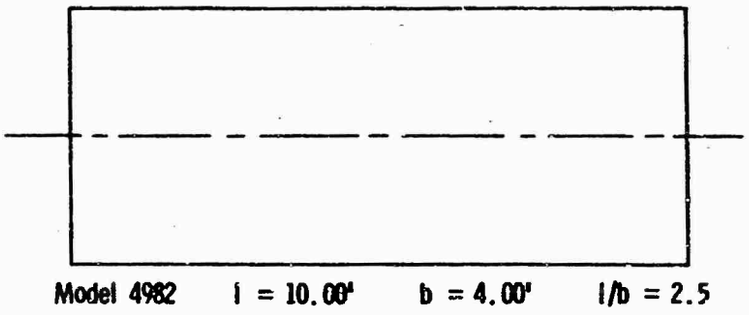
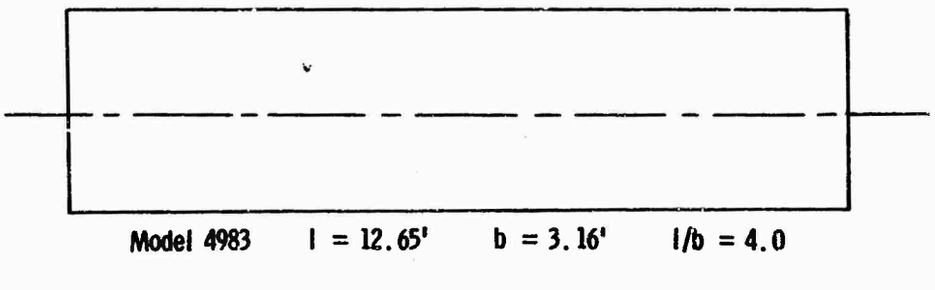


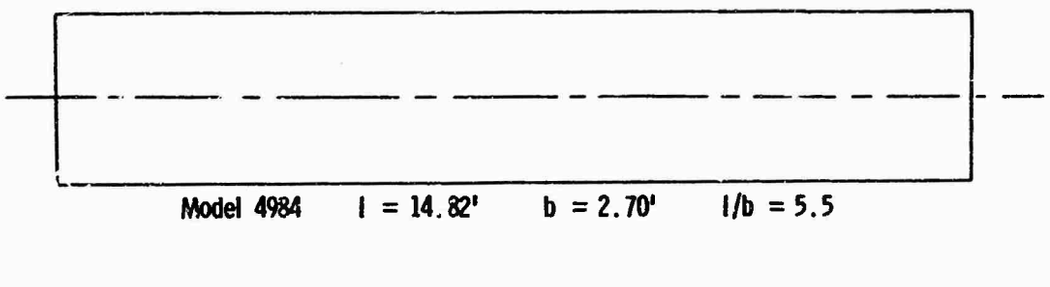
Figure 1 - Typical Hull Lines for Series



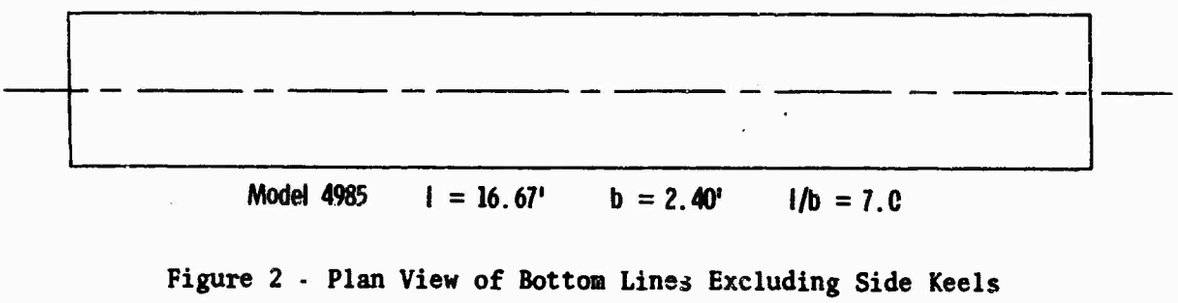
Model 4982 l = 10.00' b = 4.00' l/b = 2.5



Model 4983 l = 12.65' b = 3.16' l/b = 4.0

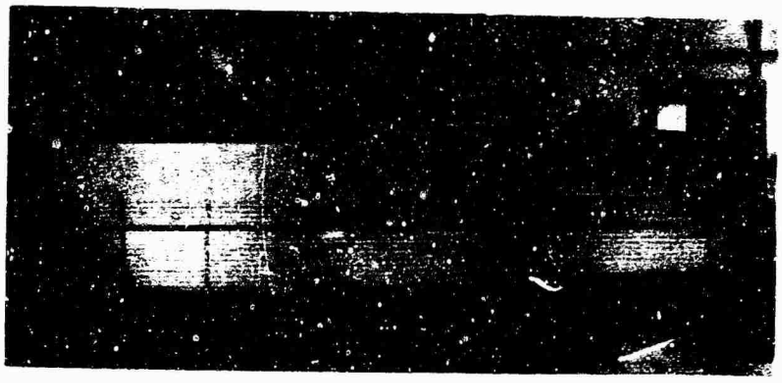


Model 4984 l = 14.82' b = 2.70' l/b = 5.5

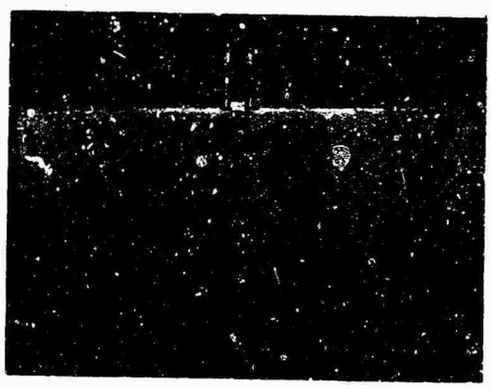


Model 4985 l = 16.67' b = 2.40' l/b = 7.0

Figure 2 - Plan View of Bottom Lines Excluding Side Keels

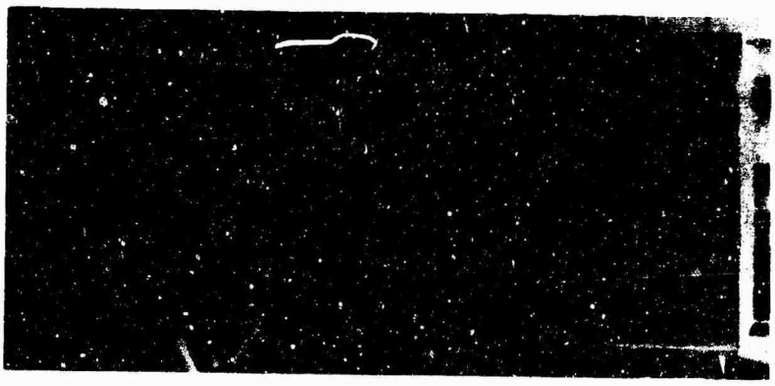


Profile



Bow

Stern



Bottom

Figure 3 - Views of Model 4982

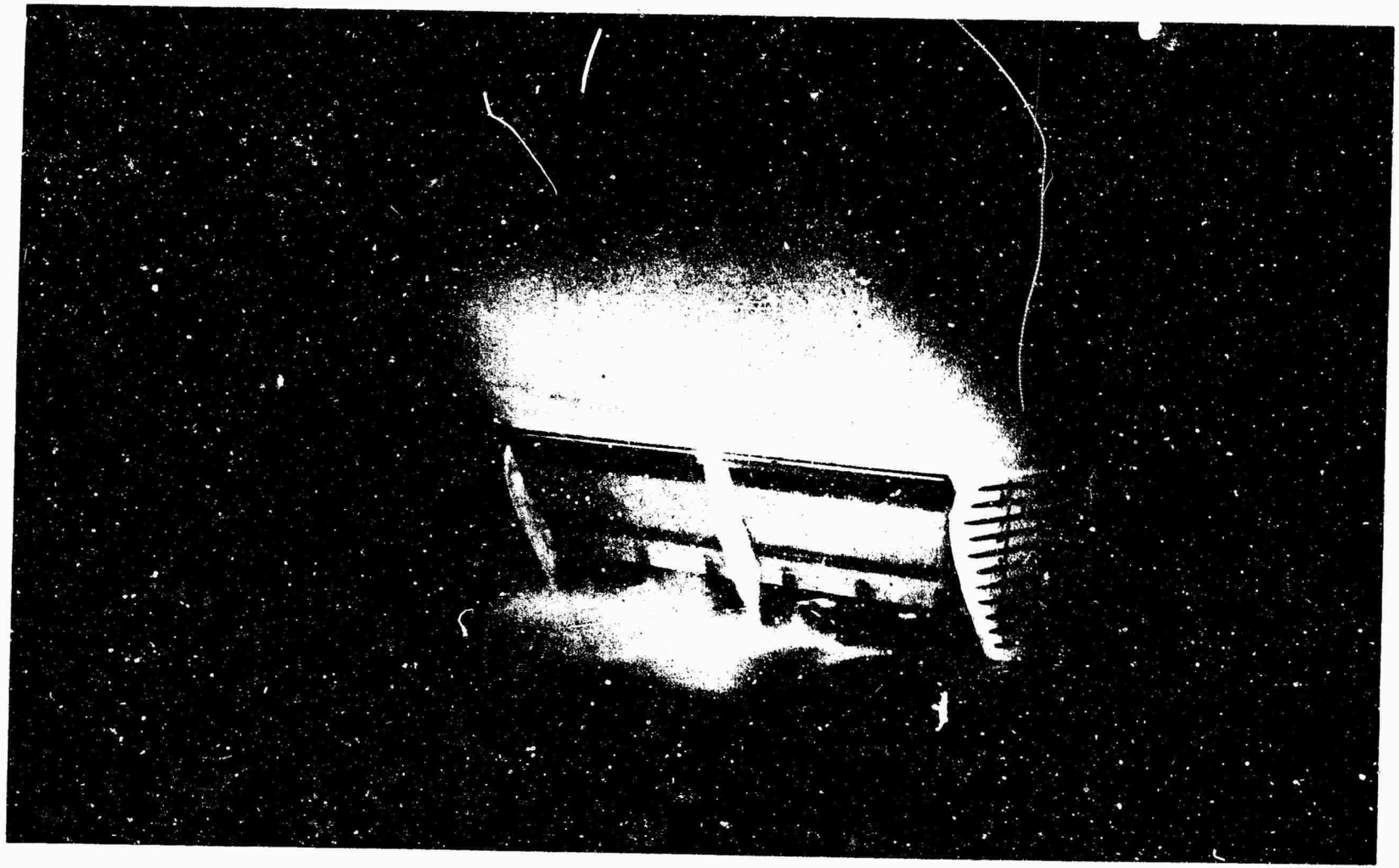


Figure 4 - Model 4984 Underway Supported by Air Chamber

Speed = 33.1 fps, Displacement = 1456 lbs, Static Trim = 0 deg

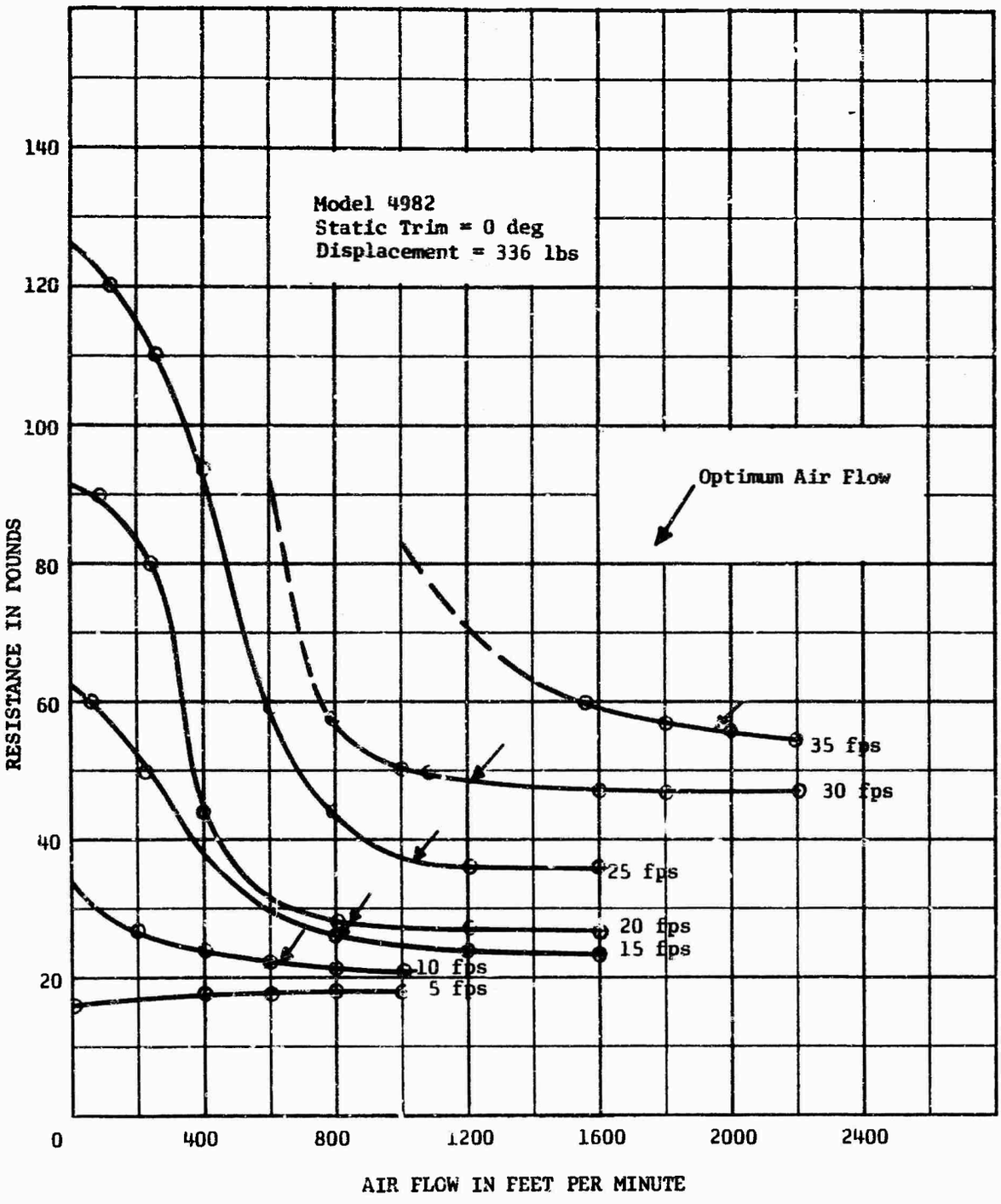


Figure 5 - Effect of Air Flow on Resistance

Figure 6 - Lift-Resistance Ratio (L/D_E) as a Function of Area Coefficient ($A/\nabla^{2/3}$) for and Froude Numbers

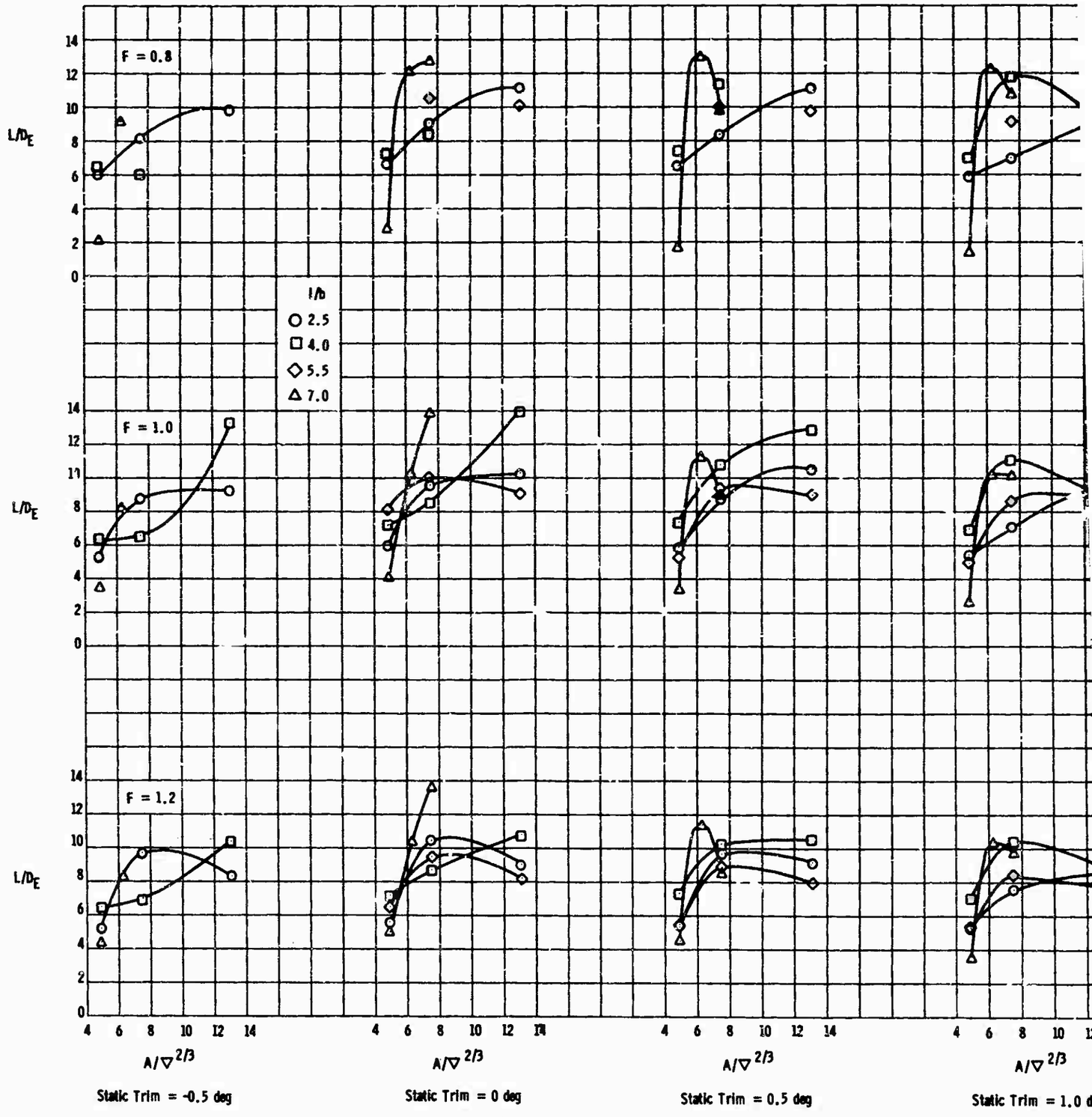


Figure 6a - F = 0.8, 1.0, 1.2

A.

io (L/D_E) as a Function of Area Coefficient ($A/\nabla^{2/3}$) for Various Static Trims and Froude Numbers

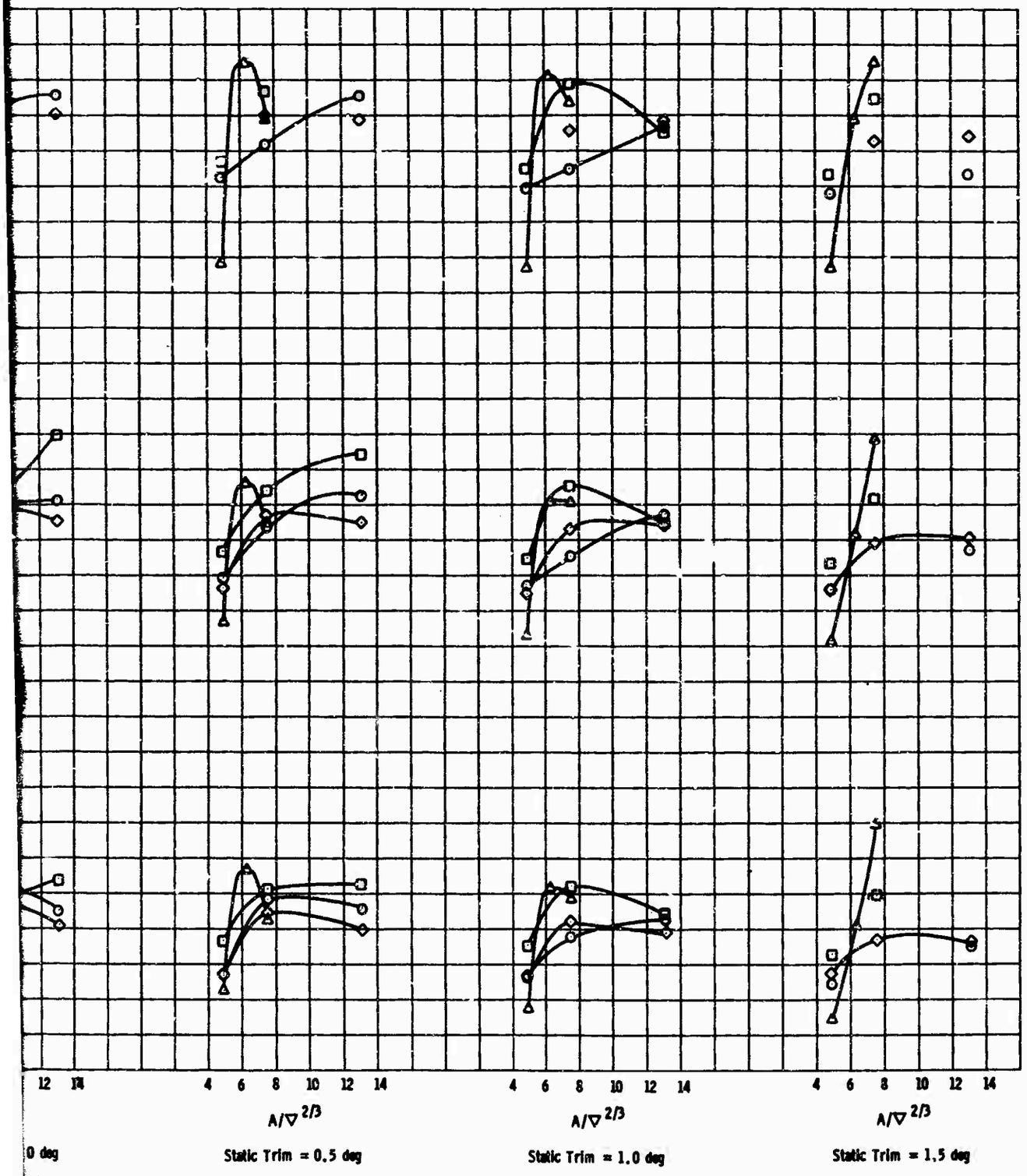


Figure 6a - F = 0.8, 1.0, 1.2

B.

Figure 6 Continued

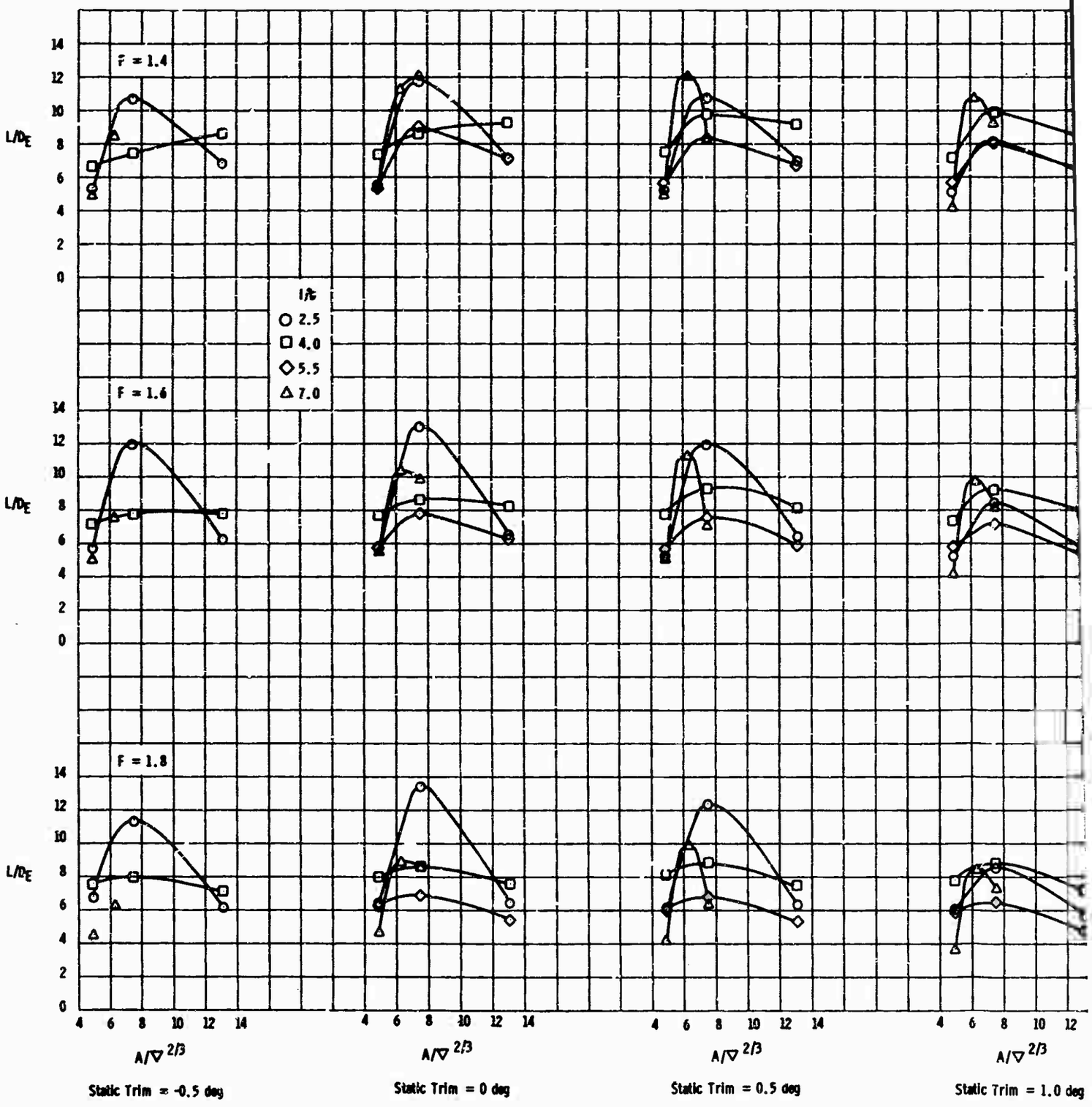


Figure 6b - F = 1.4, 1.6, 1.8

A.

Figure 6 Continued

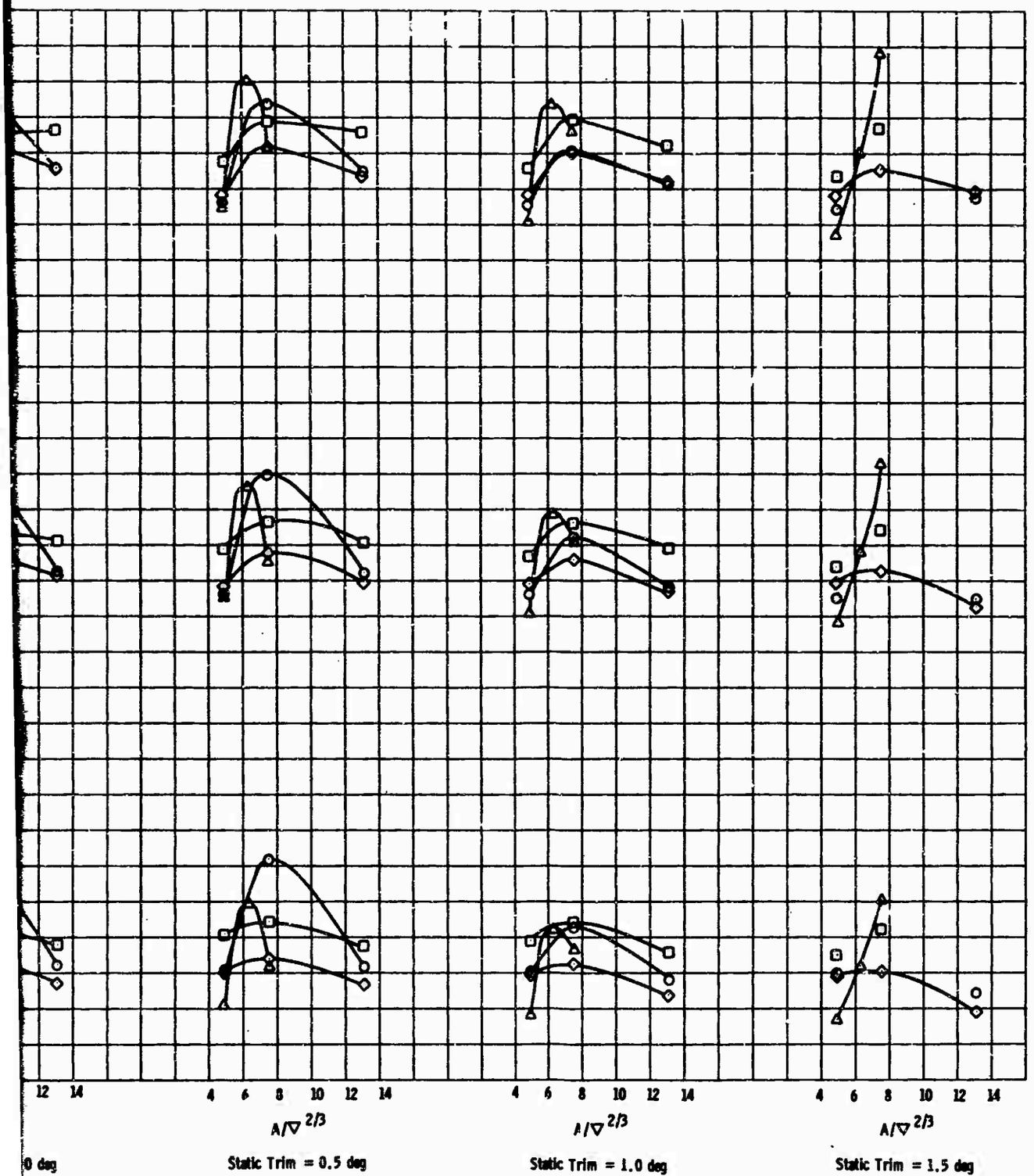


Figure 6b - F = 1.4, 1.6, 1.8

B.

Figure 6 Continued

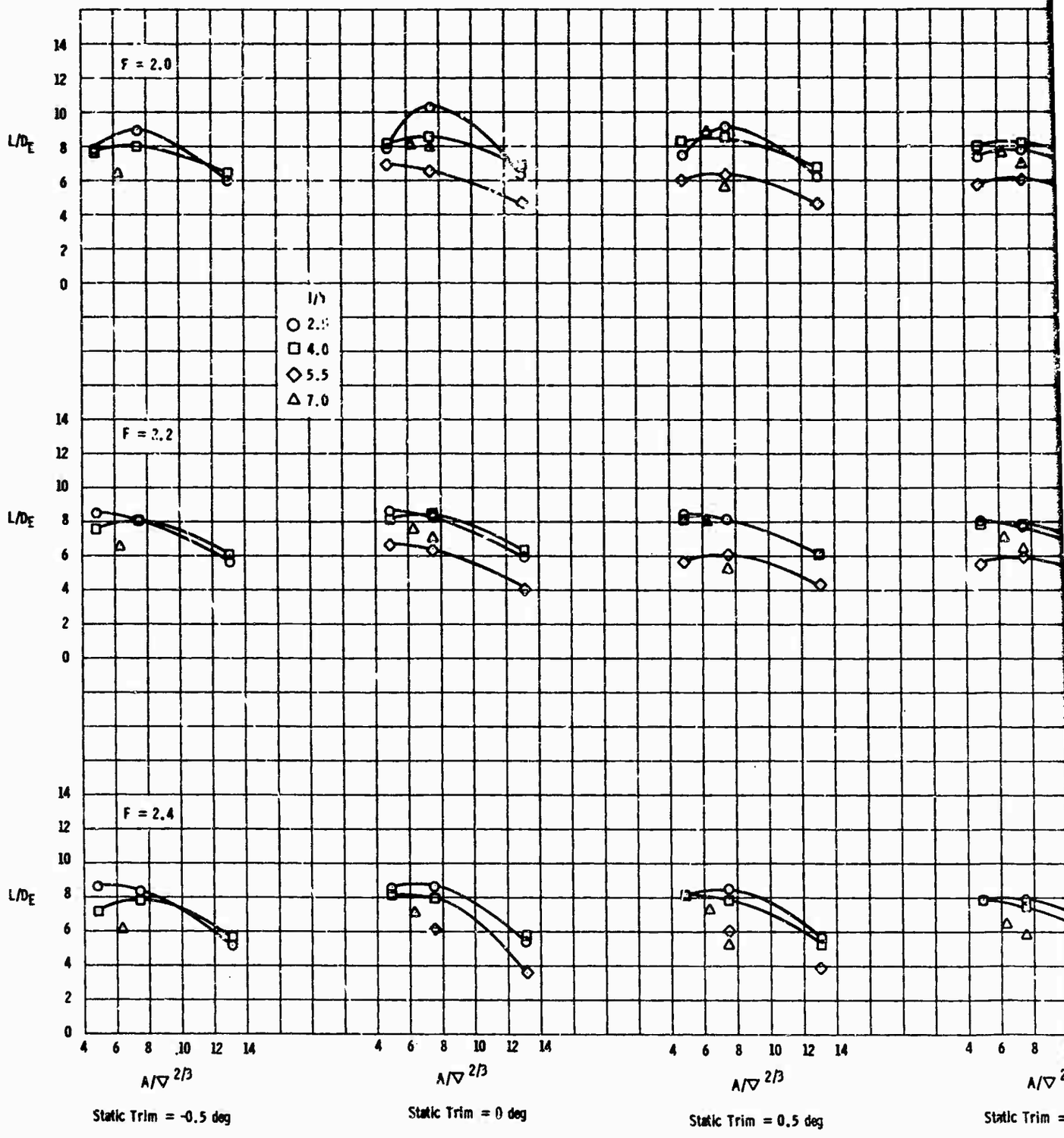


Figure 6c - F = 2.0, 2.2, 2.4

A.

Figure 6 Continued

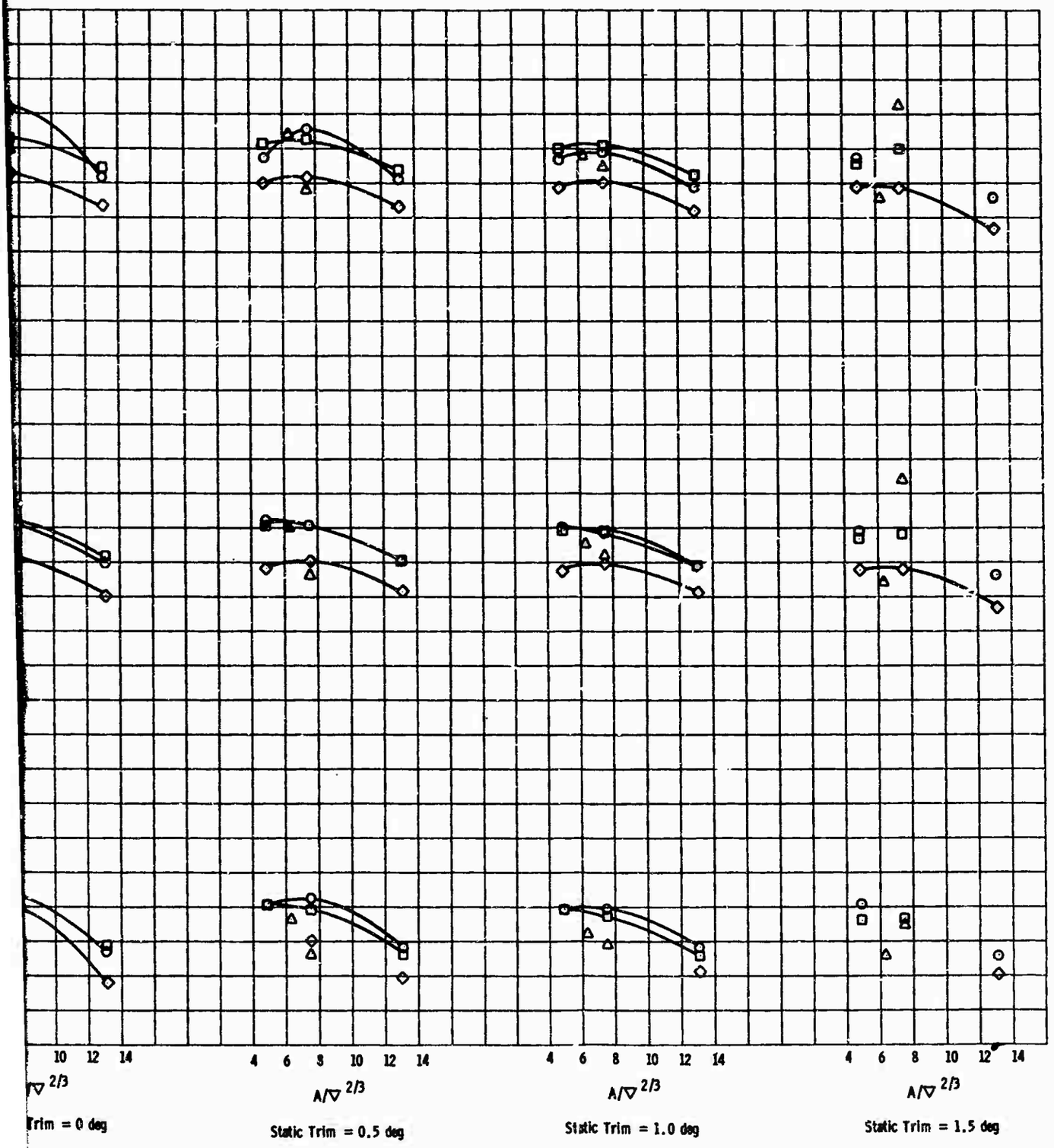


Figure 6c - F = 2.0, 2.2, 2.4

B.

TABLE 1

Experimental Results

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
MODEL 4982, LENGTH/BEAM RATIO = 2.5								
Static Trim = -0.5 deg, Displacement = 336 lbs, Water Density = 1.969* Kinematic Viscosity = 1.605*								
15.3	27.8	4.23	----	----	2.21	2000	1.97	2000
15.3	26.3	4.47	----	----	2.27	2200	2.04	2200
20.3	36.1	3.67	----	----	2.14	1600	1.91	1600
20.4	36.5	3.73	----	----	2.14	1600	1.96	1600
20.4	31.6	5.78	----	----	2.21	2000	1.96	2000
25.7	40.8	3.78	----	----	2.16	2000	2.02	2000
Static Trim = 0 deg, Displacement = 336 lbs, Water Density = 1.969 Kinematic Viscosity = 1.606								
5.1	16.4	-0.07	----	----	0	0	0	0
5.1	17.4	2.87	----	----	1.82	0	1.84	250
5.1	18.5	3.27	----	----	1.85	800	1.80	1000
5.2	17.6	3.27	----	----	1.86	500	1.82	600
5.2	18.4	3.38	----	----	1.79	1100	1.80	1200
10.0	71.8	2.70	----	----	0	0	0	0
10.0	25.3	3.15	----	----	1.76	100	1.80	200
10.0	24.2	4.30	----	----	1.87	400	1.87	600

*Water Density - Lb. Sec.^{2}/Ft.^{4}
Kinematic Viscosity - Ft.^{2}/Sec. X 10^5

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
10.0	22.0	4.35	----	----	1.91	600	1.90	800
10.0	19.6	4.75	----	----	1.94	1100	1.90	1200
10.1	20.2	4.70	----	----	1.93	800	1.91	1000
15.1	27.6	4.53	----	----	1.93	700	1.86	800
15.2	63.6	2.65	----	----	0.58	0	0.58	0
15.2	39.3	3.15	----	----	1.68	300	1.72	400
15.3	23.9	4.58	----	----	1.92	1100	1.81	1400
15.3	23.7	4.82	----	----	1.94	2100	1.84	2200
15.4	23.9	4.63	----	----	1.93	1700	1.86	1800
19.8	27.0	4.02	----	----	1.90	1600	1.83	1800
20.0	90.8	2.18	----	----	0	0	0	0
20.0	87.8	2.23	----	----	0.45	100	0.40	200
20.0	37.1	3.55	----	----	1.78	350	1.78	500
20.0	29.3	3.90	----	----	1.88	600	1.82	800
20.1	27.0	4.02	----	----	1.87	1100	1.78	1200
20.1	27.3	4.13	----	----	1.89	1500	1.76	1600
24.9	126.4	1.90	----	----	0.04	0	0.02	0
24.9	119.8	1.83	----	----	0.46	100	0.40	200
25.0	39.1	3.73	----	----	1.88	800	1.78	900
25.0	37.6	3.83	----	----	1.86	1600	1.78	1600
25.0	37.2	3.90	----	----	1.85	1700	1.77	1800
25.0	117.7	1.90	----	----	0.86	300	0.74	500
25.1	35.5	3.78	----	----	1.88	1300	1.79	1400
29.8	49.6	3.50	----	----	1.81	1000	1.76	1200
29.8	46.3	3.62	----	----	1.94	1600	1.85	1700
30.0	46.8	3.73	----	----	1.85	1900	1.77	2000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
30.0	47.8	3.62	----	----	1.85	1600	1.74	1700
34.9	56.4	3.55	----	----	1.80	2100	1.74	2200
34.9	55.8	4.30	----	----	1.76	2400	1.72	2400
35.0	60.9	3.22	----	----	1.75	1200	1.69	1500
Static Trim = 0.5 deg, Displacement = 336 lbs, Water Density = 1.969 Kinematic Viscosity = 1.606								
5.1	15.7	0	----	----	0	0	0	0
5.2	19.8	3.34	----	----	1.65	400	1.64	500
5.2	20.1	3.42	----	----	1.65	800	1.61	800
5.2	20.3	3.46	----	----	1.66	900	1.65	1000
10.3	63.1	6.90	----	----	0	0	0.32	0
10.3	19.9	8.10	----	----	1.83	1100	1.72	1200
10.4	35.3	2.40	----	----	1.22	25	1.40	75
10.4	22.5	4.40	----	----	1.78	150	1.86	500
10.4	19.9	4.50	----	----	1.84	700	1.70	900
15.2	30.5	4.15	----	----	1.75	150	1.66	400
15.2	28.8	4.18	----	----	1.75	200	1.66	700
15.2	26.6	4.23	----	----	1.81	700	1.60	1000
15.3	32.9	3.90	----	----	1.66	100	1.68	200
15.3	26.2	4.25	----	----	1.82	1000	1.62	1200
15.3	26.2	4.35	----	----	1.82	1200	1.63	1500
15.3	26.4	4.41	----	----	1.82	1600	1.62	1800
15.3	64.6	2.50	----	----	0	0	0	0
20.2	35.5	3.53	----	----	1.68	100	1.74	250
20.2	32.6	3.60	----	----	1.82	500	1.58	800

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.3	34.4	3.58	----	----	1.86	900	1.53	1200
20.4	32.1	3.52	----	----	1.86	1100	1.56	1600
20.5	31.0	3.73	----	----	1.86	1100	1.56	1600
25.3	38.4	3.59	----	----	1.78	1700	1.58	1900
25.3	40.0	3.36	----	----	1.88	700	1.60	800
25.4	40.9	3.35	----	----	1.78	1000	1.47	1200
25.4	39.3	3.35	----	----	1.78	1100	1.50	1400
25.4	80.0	1.96	----	----	1.31	600	1.28	700
25.5	39.0	3.58	----	----	1.77	1400	1.58	1600
29.6	50.6	3.13	----	----	1.73	1100	1.53	1200
29.6	49.0	3.29	----	----	1.74	1600	1.68	1600
30.3	52.9	3.08	----	----	1.67	600	1.55	800
30.3	49.8	3.11	----	----	1.75	800	1.58	1000
35.3	56.6	3.08	----	----	1.66	2000	1.54	2000
35.4	61.9	2.90	----	----	1.68	1400	1.50	1600
35.5	56.4	3.21	----	----	1.63	2200	1.60	2400
Static Trim = 1.0 deg, Displacement = 336 lbs, Water Density = 1.969 Kinematic Viscosity = 1.606								
15.0	32.4	3.55	----	----	1.36	200	1.40	400
15.0	32.6	3.55	----	----	1.36	400	1.48	600
15.1	60.5	2.87	----	----	0	0	0	0
15.1	32.2	3.55	----	----	1.35	150	1.38	200
15.3	31.9	3.67	----	----	1.48	900	1.40	1000
15.3	31.8	3.78	----	----	1.50	1100	1.43	1400
15.3	31.8	3.83	----	----	1.50	1800	1.50	1800

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.2	36.0	3.05	----	----	1.66	600	1.34	700
20.3	36.8	3.05	----	----	1.70	900	1.16	1100
20.3	37.0	3.15	----	----	1.71	1500	1.22	1600
25.2	49.3	2.58	----	----	1.64	500	1.14	900
25.2	45.2	2.75	----	----	1.74	1000	1.10	1400
25.2	43.6	2.82	----	----	1.76	1500	1.14	1800
30.0	54.0	2.58	----	----	1.48	1000	1.32	1300
30.0	52.9	2.70	----	----	1.48	1500	1.38	1600
Static Trim = -0.5 deg, Displacement = 784 lbs, Water Density = 1.969 Kinematic Viscosity = 1.606								
5.0	23.8	0	-0.5	0.5	0	0	0	0
5.0	33.1	2.01	3.0	1.0	3.45	250	3.43	150
5.0	33.8	1.51	2.0	1.0	3.46	50	3.46	75
10.1	91.8	3.52	5.0	2.0	4.16	400	4.33	300
10.1	96.4	3.41	4.5	2.3	3.42	100	3.50	150
10.1	99.3	3.41	4.5	2.3	3.68	150	3.46	200
10.2	89.8	3.64	5.0	2.3	4.38	1000	4.98	500
10.2	140.6	1.51	0	3.0	0	0	0	0
15.0	85.5	6.12	8.5	3.5	3.69	800	4.00	900
15.0	83.1	5.29	7.0	3.5	3.60	300	3.91	400
15.1	84.7	5.15	5.5	4.5	9.42	1800	9.81	2000
15.1	92.5	5.15	6.0	4.0	2.56	200	2.82	250
15.1	85.3	5.15	6.0	4.0	2.50	125	2.50	150
15.2	142.9	4.55	5.0	4.0	0	0	0	0
20.0	130.9	4.27	8.0	0.5	0	0	0	0

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.0	51.7	5.29	10.5	0	3.98	1100	4.16	1000
20.0	84.3	4.55	9.0	0	3.66	400	3.76	500
20.0	64.2	4.27	8.0	0.5	5.04	2500	5.62	3000
20.0	52.1	6.12	11.0	1.0	3.96	1200	4.22	1400
20.0	45.5	5.29	10.0	0.5	3.95	500	4.03	700
20.1	67.2	5.51	10.5	0.5	3.97	1200	4.28	1400
20.1	71.0	5.51	10.5	0.5	3.99	1000	4.25	1000
20.2	62.7	5.81	11.0	0.5	3.98	1600	4.30	1800
20.3	73.7	5.94	11.0	0.8	4.03	800	4.22	800
24.9	143.2	----	---	---	1.08	0	1.14	0
24.9	51.2	5.29	10.5	0	4.13	1300	4.35	1500
25.0	76 3	4.55	9.5	-0.5	3.84	900	4.01	1000
25.1	52.1	5.15	10.0	0	4.12	1000	4.28	1100
29.8	69.8	4.45	9.5	-0.8	3.95	2800	4.24	3000
29.8	84.9	4.55	10.0	-1.0	3.84	1500	4.04	1700
29.9	69.7	4.27	9.5	-1.0	3.92	2300	4.22	2600
30.0	38.9	4.55	10.0	-1.0	4.00	1500	4.19	1800
30.0	30.6	4.55	10.0	-1.0	3.98	1600	4.22	1800
30.0	66.3	4.55	10.0	-1.0	4.02	1800	4.32	2000
30.0	85.3	4.55	10.0	-1.0	3.80	1500	4.08	1600
30.0	81.2	4.55	10.0	-1.0	3.84	1800	4.10	2000
30.0	73.0	4.79	10.5	-1.0	3.88	2100	4.18	2400
34.3	84.5	4.15	10.0	-1.8	3.74	1800	4.34	2000
34.5	80.0	4.45	10.5	-1.8	3.77	2200	4.04	2500
35.3	85.7	4.15	10.0	-1.8	3.88	2000	4.94	2200
35.6	84.4	4.27	10.3	-1.8	3.94	1800	5.38	2000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0 deg, Displacement = 784 lbs, Water Density = 1.969 Kinematic Viscosity = 1.633								
5.0	25.6	0.13	1.3	-1.0	0	0	0	0
5.0	33.7	2.91	4.5	1.3	3.56	600	3.62	700
5.0	31.6	2.78	4.3	1.3	3.52	300	3.59	400
5.0	28.2	1.28	1.3	1.3	2.06	25	2.04	15
5.1	37.0	2.78	4.0	1.5	3.54	500	3.59	600
5.1	33.2	2.64	4.0	1.3	3.45	100	3.50	200
10.0	143.3	1.01	-0.5	2.5	0	0	0	0
10.0	77.1	5.15	7.5	2.5	3.76	700	3.78	800
10.1	90.9	1.01	4.5	2.5	3.38	100	2.76	300
10.1	111.7	3.01	3.0	3.0	2.73	25	2.89	25
10.1	77.8	5.15	7.5	2.5	3.82	900	3.83	1000
10.1	78.4	5.15	7.5	2.5	3.79	600	3.80	700
10.1	77.4	4.79	7.0	2.5	3.77	450	3.78	600
10.1	78.5	5.15	7.5	2.5	3.82	1000	3.86	1200
10.2	88.9	3.79	5.0	2.5	3.26	300	3.75	400
10.3	86.5	3.79	5.5	2.0	3.44	100	3.74	200
15.0	70.5	6.65	10.0	3.3	3.86	2800	3.89	3000
15.0	118.1	6.65	9.5	4.0	0.96	70	0.44	125
15.1	88.1	6.15	9.5	3.3	3.71	300	3.77	600
15.1	87.8	6.54	10.0	3.0	3.76	400	3.79	600
15.2	83.4	6.15	9.0	3.3	3.74	300	4.85	500
15.2	88.0	5.51	7.5	3.5	3.72	250	3.74	300
15.3	81.6	6.54	10.0	3.0	3.84	900	3.85	1000
15.3	84.0	6.29	9.5	3.0	3.84	600	4.14	700
15.3	74.7	6.29	9.5	3.0	3.83	1600	5.34	1700

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.4	92.2	5.51	8.0	3.0	3.55	150	5.00	200
15.5	122.9	5.29	7.0	3.5	0	0	0	0
19.9	68.1	5.51	11.0	0	3.71	1800	3.94	2000
20.0	64.9	5.29	10.5	0	3.78	1800	3.94	2000
20.0	131.8	----	---	---	0	0	0	0
20.0	92.8	4.55	9.5	-0.5	3.30	200	3.33	300
20.0	70.0	5.29	10.5	0	3.66	800	3.96	600
20.0	72.8	5.29	10.5	0	3.70	600	3.88	500
20.0	76.7	5.29	10.5	0	3.75	300	3.75	300
20.1	65.7	5.51	11.0	0	4.01	1400	4.13	1600
20.1	64.9	5.41	10.8	0	3.94	800	4.12	1200
25.1	69.3	4.55	10.0	-1.0	4.02	1300	4.07	1500
25.2	66.0	4.55	10.0	-1.0	4.01	1900	4.06	2200
25.2	73.4	4.55	10.0	-1.0	3.72	900	3.80	1000
25.2	110.8	3.29	8.0	-1.5	2.82	400	2.82	600
25.2	71.3	4.27	9.5	-1.0	3.72	900	3.79	1100
25.2	77.6	4.45	9.8	-1.0	3.72	650	3.79	750
25.3	75.3	4.55	10.0	-1.0	4.00	1000	4.11	1200
25.3	67.7	4.79	10.5	-1.0	4.02	1600	4.11	1800
29.9	77.3	3.79	9.5	-2.0	3.70	1000	3.79	1100
30.1	78.8	3.91	9.5	-1.8	3.74	1000	3.80	1100
30.3	77.3	3.79	9.5	-2.0	3.74	1200	3.82	1600
30.8	77.1	3.79	9.5	-2.0	3.79	1600	3.84	1800
34.7	69.9	3.79	10.0	-2.5	3.76	2500	3.88	3000
34.9	73.1	4.05	10.0	-2.5	3.71	2500	3.89	3000
34.9	66.2	3.52	9.0	-2.0	3.74	2000	4.46	2200
35.0	77.6	3.79	10.0	-2.5	3.67	2000	4.11	2200
35.1	78.8	3.64	9.5	-2.3	3.68	1800	3.78	2000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0.5 deg, Displacement = 784 lbs, Water Density = 1.969 Kinematic Viscosity = 1.561								
4.9	20.2	0.52	1.0	0	0	0	0	0
5.0	33.0	1.69	2.0	1.0	3.13	50	4.28	100
5.0	23.4	0.15	-0.5	0.3	0	0	0	0
9.9	137.9	1.75	1.3	2.3	0	0	0.24	0
10.0	78.6	5.51	9.5	1.5	3.74	2500	3.52	3000
10.0	87.6	3.52	4.5	2.5	2.95	100	3.85	150
10.1	77.6	5.51	9.0	2.0	4.15	1000	3.59	1800
10.1	76.7	5.41	9.0	1.8	3.73	2000	3.58	2250
10.1	82.7	4.55	6.5	2.5	3.33	70	3.45	350
10.1	92.6	3.79	5.0	2.5	2.70	100	2.70	200
10.2	80.9	----	---	---	3.40	40	3.55	300
10.2	77.1	4.65	7.0	2.3	3.62	600	3.45	300
10.2	78.6	5.51	9.0	2.0	3.78	1500	4.77	2000
10.2	78.7	5.51	8.5	2.5	3.65	1000	4.07	1600
15.0	78.1	6.12	2.9	9.5	3.65	1000	3.57	1600
15.0	80.0	6.49	2.8	10.1	3.69	3500	3.23	2500
15.1	80.5	5.97	9.3	2.5	3.72	150	3.74	300
15.1	75.7	1.01	-0.5	2.5	3.69	650	2.89	800
15.1	93.1	1.01	-0.5	2.5	3.35	150	3.45	250
15.2	123.8	5.29	7.0	3.5	0.01	0	0.01	0
15.2	77.7	6.29	10.0	2.5	3.76	1000	4.69	1600
15.2	84.1	5.97	9.3	2.5	3.58	500	3.62	600
15.3	77.3	6.29	10.0	2.5	3.66	800	4.13	1400
15.3	73.4	5.97	9.3	2.5	3.58	1100	3.64	1100

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.3	86.6	5.97	9.3	2.5	3.65	550	5.03	500
15.3	80.1	5.34	9.0	1.5	5.04	2000	3.69	2400
15.5	112.1	6.23	9.3	3.0	2.48	150	4.13	150
15.7	78.4	5.97	9.3	2.5	3.59	700	4.24	800
19.6	71.3	4.79	10.0	-0.5	3.61	900	3.56	1100
19.8	69.7	5.15	10.5	-0.5	3.85	2000	3.38	2500
19.8	68.0	5.15	10.0	-0.5	3.85	2600	3.43	3000
19.8	117.3	3.52	9.0	-2.0	1.67	150	1.64	200
19.9	73.8	5.15	10.5	-0.5	4.33	1600	3.64	2000
19.9	78.9	4.05	10.0	-2.0	3.54	250	3.58	350
20.0	70.7	4.79	10.0	-0.5	3.79	700	3.33	1600
20.0	73.9	5.15	10.3	-0.3	3.81	1600	3.29	2500
20.0	73.1	4.89	10.3	-0.6	3.85	1600	3.33	2000
20.0	51.7	5.15	10.5	-0.5	3.66	1400	3.52	1700
20.0	67.0	----	---	---	3.81	1600	3.36	2000
20.1	74.8	5.15	10.8	-0.5	3.99	1600	4.39	2500
20.1	57.3	5.15	10.5	-0.5	3.81	2000	3.39	2100
20.2	68.1	3.79	10.0	-2.5	3.80	1100	3.38	1600
20.3	129.4	4.27	8.0	0.5	0.08	0	0.67	0
20.4	72.4	4.79	10.0	-0.5	3.63	1000	3.94	1300
20.4	76.4	4.79	10.0	-0.5	3.59	400	3.53	800
20.6	78.9	4.79	10.0	-0.5	3.64	300	4.23	400
21.1	78.0	4.79	10.0	-0.5	3.59	300	4.14	600
24.8	79.2	4.05	9.5	-1.5	3.68	400	3.66	700
25.0	73.9	----	---	---	3.85	1000	3.28	1500
25.1	155.8	3.52	7.5	-1.5	0.19	0	0.45	0

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
25.1	70.2	4.27	10.0	-1.5	3.86	1600	3.69	2000
25.1	75.1	3.29	10.0	-3.5	3.80	1200	3.28	1800
25.1	71.7	3.29	10.0	-3.5	3.87	2200	3.33	2500
25.1	80.4	3.52	9.5	-2.5	3.57	400	3.48	850
25.1	78.8	4.05	9.0	-1.0	3.64	700	3.43	1000
25.2	67.9	4.15	10.0	-1.8	3.74	3000	3.72	3000
25.2	78.9	3.29	9.5	-3.0	3.65	700	3.40	1200
25.2	151.5	3.01	7.0	-1.0	0.43	100	0.39	150
25.3	80.0	3.52	9.5	-2.5	3.83	750	3.86	1000
25.5	80.2	3.41	9.5	-2.8	3.67	900	3.94	1400
25.5	105.8	----	---	---	3.08	350	3.42	500
29.6	72.7	4.05	10.0	-2.0	3.39	2500	3.39	2500
29.7	65.6	4.05	10.0	-2.0	3.62	3500	4.09	3500
29.9	70.2	4.05	10.0	-2.0	3.62	3500	4.12	4000
29.9	78.5	3.79	9.5	-2.0	3.50	1800	3.71	2000
29.9	76.2	3.79	9.5	-2.0	3.58	3500	3.84	4000
30.0	80.6	3.52	9.0	-2.0	3.50	1600	3.84	1800
30.0	80.2	3.52	9.0	-2.0	3.52	1200	3.66	1400
30.1	77.8	3.79	9.5	-2.0	3.51	2200	3.60	2500
30.1	80.7	3.52	9.0	-2.0	3.47	1200	3.53	1400
30.3	68.3	4.05	10.0	-2.0	3.69	3000	3.69	3500
30.4	77.1	4.27	10.0	-1.5	3.52	3000	3.70	3000
30.8	77.7	3.29	9.5	-3.0	3.48	2800	3.54	3000
31.2	79.3	3.52	9.0	-2.0	3.52	1600	3.58	1800
34.9	81.4	3.41	9.5	-2.8	3.48	2300	3.63	2500
34.9	82.0	3.52	9.5	-2.5	3.46	1800	3.72	2000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
35.1	77.2	4.05	10.0	-2.0	3.88	4000	----	4500
37.3	77.5	3.52	10.0	-3.0	3.54	3200	4.58	3800
37.3	87.9	3.29	9.3	-2.8	3.54	1600	5.02	1800
Static Trim = 1.0 deg, Displacement = 784 lbs, Water Density = 1.969 Kinematic Viscosity = 1.689								
15.2	96.1	6.12	10.0	2.0	2.92	1600	3.21	1800
15.3	132.6	5.68	8.5	2.8	0	0	0	0
15.3	97.3	6.12	9.8	2.3	2.75	1200	3.05	1500
15.3	113.3	6.12	9.0	3.0	2.32	300	2.38	300
15.3	97.5	5.81	9.0	2.5	2.70	1000	3.04	1000
15.3	93.0	5.29	7.5	3.0	3.12	800	3.42	800
15.3	102.9	5.91	9.0	2.8	2.68	600	3.00	500
20.0	89.5	3.64	7.5	-0.3	4.42	600	4.54	400
20.1	124.7	3.29	7.0	-0.5	0.97	250	0.96	200
20.1	131.2	4.27	9.0	-0.5	0	0	0	0
20.2	79.3	4.55	10.0	-1.0	3.14	1600	3.47	1500
20.2	81.7	4.27	9.8	-1.3	3.01	700	3.32	500
20.5	82.1	3.91	9.5	-1.8	2.97	1000	3.42	1000
25.2	83.9	3.52	9.0	-2.0	2.77	1100	3.80	800
25.3	150.5	3.41	7.5	-1.8	0.15	0	0.16	0
25.3	83.5	3.52	9.0	-2.0	3.10	700	3.58	400
25.4	85.4	3.52	9.0	-2.0	2.68	1000	3.77	700
30.0	83.6	3.52	9.0	-2.0	2.58	2500	4.27	2400
30.1	83.9	3.29	9.3	-2.8	3.15	1800	3.64	1800
35.1	82.2	3.01	9.0	-3.0	3.26	1900	3.59	1900
35.1	82.5	2.64	9.0	-3.8	3.28	2500	3.60	2500

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0 deg, Displacement = 1457 lbs, Water Density = 1.969 Kinematic Viscosity = 1.661								
4.9	55.5	2.91	4.0	1.8	6.34	700	6.38	800
5.0	54.2	2.52	3.5	1.5	6.06	50	6.34	500
5.0	32.9	0.01	-1.0	0.3	0	0	0	0
10.0	206.4	4.79	5.8	3.8	6.38	175	6.54	300
10.0	218.4	1.51	-1.0	4.0	0	0	0	0
10.0	228.4	----	8.0	4.0	6.84	1100	6.88	1300
10.0	218.1	3.01	2.0	4.0	0	0	0	0
10.1	223.8	5.81	7.5	4.0	5.86	50	6.20	500
10.1	219.6	5.51	7.0	4.0	5.72	50	5.92	150
10.2	214.1	5.29	6.0	4.5	6.70	300	6.84	500
15.0	225.7	10.24	14.0	6.5	6.86	1900	6.87	2000
15.0	271.7	8.78	11.3	6.3	5.08	200	5.18	300
15.1	272.6	8.28	9.8	6.8	0	0	0	0
15.1	215.0	10.24	14.3	6.3	6.92	2000	6.94	2100
15.1	244.1	9.75	13.8	5.8	6.85	700	6.85	1000
15.1	273.1	9.99	13.0	7.0	5.74	1300	5.46	1400
15.2	246.4	9.75	12.3	6.8	7.18	500	7.30	800
15.2	216.5	10.72	14.8	6.8	6.80	1500	6.80	1600
15.2	271.7	10.24	13.8	6.8	6.25	2100	6.20	2200
15.2	272.2	10.24	13.8	6.8	5.97	1700	5.74	1900
19.3	243.1	7.64	15.0	0.3	1.68	600	1.62	800
20.0	185.9	7.41	14.5	0.3	6.37	1900	6.16	1800
20.0	255.1	7.53	14.8	0.3	0	0	0	0
20.0	227.9	7.79	15.3	0.3	3.84	1700	3.58	1800

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.0	249.1	7.64	15.0	0.3	1.86	900	1.69	1000
20.2	173.4	----	---	---	6.70	1800	6.64	2000
20.2	208.3	7.64	15.0	0.3	5.45	2100	5.32	2300
25.0	240.6	6.54	14.0	-1.0	1.91	1100	1.63	1400
25.0	217.7	5.94	14.0	-1.3	4.06	2200	3.50	2600
25.1	251.1	5.29	10.0	0.5	7.32	450	7.41	500
25.1	235.9	6.12	13.3	-1.3	1.72	1300	2.22	1600
25.1	204.7	5.81	13.0	-1.5	4.96	1900	4.46	2000
25.1	214.9	6.29	14.0	-1.5	4.07	2000	3.26	2400
25.2	238.2	6.12	13.5	-1.5	2.10	1600	1.73	1700
25.3	277.7	6.54	14.0	-1.0	0.10	0	0.20	0
29.8	159.7	6.29	15.5	-3.0	7.05	1900	5.90	2000
30.0	241.6	4.55	12.0	-3.0	0.57	200	0.55	300
30.0	158.0	5.15	13.0	-3.0	6.36	1300	6.20	1500
30.0	172.6	5.29	13.0	-2.5	6.00	500	6.10	600
30.0	165.2	4.79	13.0	-3.5	6.30	700	6.22	1000
30.0	259.4	5.15	12.5	-2.5	0	0	0	0
Static Trim = 0.5 deg, Displacement = 1457 lbs, Water Density = 1.969 Kinematic Viscosity = 1.661								
5.0	54.6	2.35	----	----	6.27	700	6.63	500
5.0	32.0	-0.42	----	----	0	0	0	0
5.2	54.4	2.30	----	----	6.48	500	7.53	200
10.0	211.5	4.53	----	----	7.52	1000	7.86	1000
10.0	211.3	4.53	----	----	7.10	600	7.31	600
10.0	211.7	4.13	----	----	5.90	50	6.14	200

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
10.0	227.9	0.63	----	----	0	0	0	0
10.1	212.5	4.53	----	----	8.84	1400	10.38	1400
15.1	222.2	9.01	13.0	5.0	6.47	2000	6.80	2100
15.1	233.5	8.37	----	----	5.72	1500	6.18	1600
15.1	252.3	8.32	----	----	5.88	200	5.97	400
15.2	223.4	9.01	13.0	5.0	6.21	1900	6.50	1800
15.2	226.5	9.01	13.0	5.0	6.24	1200	6.54	1200
15.2	236.9	8.67	----	----	6.33	900	6.54	900
15.2	353.5	7.54	9.0	6.0	0	0	0	0
19.9	275.4	7.09	14.0	0	0.75	1500	0.86	1600
20.0	266.2	7.09	14.0	0	1.55	1800	1.68	1900
20.0	281.4	6.79	14.0	-0.5	0.21	200	0.20	250
20.0	287.9	7.79	15.0	0.3	0	0	0	0
20.1	266.3	----	14.5	-0.5	1.50	1100	1.10	1500
20.1	272.9	7.42	----	----	0.59	600	0.62	800
20.2	263.4	7.13	----	----	1.42	1900	1.48	2000
20.2	286.7	----	----	----	0.94	1400	0.99	1600
24.8	264.5	5.51	13.3	-2.3	0.28	300	0.28	400
24.9	264.6	5.68	13.3	-2.0	0.15	0	0.15	0
25.0	241.3	5.67	----	----	1.89	2000	1.96	2200
25.0	260.6	4.79	12.0	-2.5	0.35	700	0.35	800
25.1	236.7	5.51	13.0	-2.0	1.84	1800	1.86	1900
25.3	207.0	----	----	----	4.81	2000	5.23	2300
25.4	246.7	6.23	----	----	1.64	1200	1.76	1400
25.4	234.4	4.35	----	----	2.59	2300	2.70	2400
29.5	156.1	4.53	----	----	6.40	1800	6.89	1800

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
29.5	161.0	4.53	----	----	6.44	1400	6.96	1400
29.5	253.4	4.02	----	----	0.20	0	0.25	0
29.7	163.8	4.42	----	----	6.32	1200	6.68	1200
29.7	166.8	4.58	----	----	6.25	800	6.40	800
29.7	245.9	4.35	----	----	0.53	150	0.50	200
29.8	151.8	4.53	----	----	6.39	2000	7.02	2000
29.8	216.6	4.23	----	----	3.40	300	3.46	400
34.2	161.0	3.73	----	----	6.56	1700	6.78	1800
34.6	156.5	3.83	----	----	6.31	2000	6.59	2000
35.0	157.2	3.78	----	----	7.00	2400	6.74	2400
35.3	261.6	3.33	----	----	2.07	350	2.03	600
36.5	181.0	3.50	----	----	5.44	1000	7.46	1400
Static Trim = 1.0 deg, Displacement = 1457 lbs, Water Density = 1.969 Kinematic Viscosity = 1.661								
5.2	38.9	-0.35	----	----	0	0	0	0
5.2	65.8	2.58	----	----	5.86	100	6.30	400
5.3	63.8	2.87	----	----	6.09	500	6.18	600
5.3	64.5	3.05	----	----	6.18	800	6.18	900
10.3	240.4	5.38	----	----	6.94	800	6.94	1000
10.4	256.7	2.34	----	----	0	0	0	0
10.4	245.6	5.10	----	----	6.30	75	6.59	200
10.4	241.2	5.32	----	----	7.09	1000	8.46	1500
11.2	246.9	5.20	----	----	6.72	450	7.68	600
15.0	244.9	8.65	----	----	6.85	1400	7.98	1600
15.0	226.1	8.08	----	----	6.42	1600	6.50	1800

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.1	247.3	8.65	----	----	6.33	300	6.48	600
15.1	278.6	8.27	----	----	0	0	0	0
15.2	223.9	8.08	----	----	6.52	2200	6.89	2500
15.3	238.8	8.93	----	----	6.64	1000	7.78	1200
16.0	224.9	8.08	----	----	6.45	1800	6.47	2000
20.0	245.9	7.13	----	----	2.56	3200	2.38	3500
20.0	248.1	7.13	----	----	2.84	3000	2.58	3000
24.9	192.1	5.27	----	----	5.00	2300	5.18	2300
25.2	205.2	5.32	----	----	4.23	1800	3.57	2000
25.6	232.7	5.32	----	----	2.22	1400	2.03	1600
25.6	231.8	5.20	----	----	2.13	1800	2.42	1800
26.4	248.5	5.48	----	----	2.41	2000	3.26	2000
30.0	162.7	4.30	----	----	6.89	2100	6.66	2200
30.0	169.8	4.13	----	----	6.80	1100	7.72	1100
30.0	167.1	4.23	----	----	6.37	1200	6.13	1400
30.1	187.2	4.13	----	----	5.58	500	5.67	700
30.3	165.2	4.30	----	----	6.52	1500	6.24	1700
30.7	256.0	3.95	----	----	0.12	0	0.18	0
30.9	251.2	4.07	----	----	0.98	250	1.06	300
32.5	162.3	4.30	----	----	7.00	2200	6.38	2400
35.1	161.9	3.55	----	----	6.82	2800	6.63	2800
35.2	161.9	3.45	----	----	6.30	1800	6.36	1800
36.7	151.8	3.55	----	----	6.68	2200	6.44	2200

TABLE 1 - Continued

Speed fps	Resistance lbs	δ_T deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
MODEL 4983, LENGTH/BEAM RATIO = 4.0								
Static Trim = -0.5 deg, Displacement = 336 lbs, Water Density = 1.966, Kinematic Viscosity = 1.173								
25.1	33.0	2.72	6.85	-1.33	2.20	4000	2.22	3500
Static Trim = 0 deg, Displacement = 336 lbs, Water Density = 1.966, Kinematic Viscosity = 1.173								
5.0	12.8	----	-0.20	0.07	0	0	0	0
10.0	48.6	0.63	0.70	0.57	0	0	0	0
15.1	80.2	0.92	1.64	0.92	0	0	0	0
15.1	12.4	3.68	8.33	-0.80	1.74	4000	1.64	3200
15.1	11.4	3.76	8.43	-0.76	1.74	4500	1.64	3700
15.1	14.1	3.63	8.20	-0.80	1.74	3000	1.62	2500
20.0	21.0	3.48	8.32	-1.18	1.74	3200	1.62	3000
20.0	19.2	3.59	8.60	-1.26	1.69	5000	1.64	4000
20.1	20.5	3.60	8.75	-1.39	1.70	4100	1.64	3900
20.2	25.9	3.37	7.98	-1.10	1.72	2000	1.56	2000
20.2	25.1	3.49	8.26	-1.16	1.72	2600	1.54	2400
24.8	32.9	3.37	8.29	-1.42	1.68	3000	1.55	2500
24.9	27.7	3.48	8.38	-1.25	1.64	4500	1.58	3500
25.0	35.1	3.29	7.93	-1.21	1.66	2000	1.57	2000
25.4	28.9	3.49	8.54	-1.42	1.64	4500	1.64	4000
29.9	45.3	3.44	8.21	-1.19	1.64	2200	1.50	2200
29.9	37.0	3.44	8.53	-1.52	1.62	4500	1.60	4000
30.0	41.1	3.29	8.37	-1.65	1.66	3000	1.53	2500

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
30.2	37.8	3.90	8.56	-1.57	1.64	5000	1.60	4000
35.0	45.0	3.36	8.66	-1.79	1.58	5000	1.56	4000
35.0	51.1	3.09	8.10	-1.77	1.62	2500	1.49	2500
35.0	47.8	3.42	8.43	-1.76	1.61	4000	1.54	3000
35.1	47.4	3.30	8.50	-1.76	1.58	4500	1.56	3500
Static Trim = 1.0 deg, Displacement = 336 lbs, Water Density = 1.966, Kinematic Viscosity = 1.173								
4.9	9.5	2.52	4.98	0.17	1.05	600	1.00	600
5.3	11.9	0.59	1.04	0.17	0.19	0	0	0
5.3	11.9	0.59	1.04	0.17	0.19	200	0	100
10.0	33.6	1.31	1.67	1.00	0	0	0	0
15.2	27.7	3.10	7.25	-0.92	1.16	2000	1.05	2000
15.3	22.8	3.22	7.64	-1.05	1.23	4200	1.13	4000
15.3	49.3	2.25	4.33	0.25	0.35	0	0.33	0
15.3	23.0	3.16	7.61	-1.17	1.22	3000	1.08	3000
20.2	30.5	2.72	7.49	-1.96	1.24	2500	1.11	2500
20.3	28.7	2.86	8.00	-2.16	1.26	4500	1.16	4200
20.3	28.5	2.76	7.72	-2.08	1.24	3200	1.12	3200
20.4	34.0	2.50	6.88	-1.80	1.26	900	1.04	1100
25.2	39.8	2.48	7.19	-2.17	1.31	1700	1.02	1700
25.3	45.9	2.21	6.48	-1.96	1.08	300	1.10	600
25.3	36.5	2.64	7.50	-2.12	1.20	3200	1.16	3000
25.4	37.2	2.72	7.76	-2.21	1.18	5000	1.18	4000
29.9	43.7	2.14	7.72	-2.37	1.16	5000	1.20	4000
30.0	48.5	2.30	7.01	-2.30	1.22	1600	1.10	1800

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
30.0	48.9	2.38	7.25	-2.43	1.17	2200	1.14	2200
30.0	45.0	2.57	7.74	-2.50	1.16	3800	1.18	3500
34.8	51.6	2.52	7.86	-2.67	1.14	4500	1.18	4000
34.8	61.6	2.14	6.90	-2.53	1.11	1300	1.08	1300
35.1	58.7	2.34	7.26	-2.48	1.13	3000	1.14	3000
Static Trim = -0.5 deg, Displacement = 784 lbs, Water Density = 1.966, Kinematic Viscosity = 1.157								
5.0	21.8	0.98	2.12	-0.13	3.37	200	3.68	600
5.0	21.6	1.01	2.36	-0.31	3.38	150	3.72	800
5.0	20.5	1.12	3.39	-0.89	3.58	1000	3.74	1100
5.1	15.9	----	-0.59	0.25	0	0	0	0
10.0	61.0	2.15	4.39	-0.20	4.63	600	4.98	700
10.1	69.0	1.90	3.64	0.32	3.20	750	3.16	100
10.1	66.9	2.06	3.79	0.32	3.75	250	3.64	200
10.1	65.3	2.07	3.92	0.26	4.00	300	3.82	300
10.1	62.4	2.09	4.07	0.20	4.83	500	4.59	400
10.1	61.9	2.09	4.14	0.14	4.78	500	4.56	500
10.2	113.2	----	-1.01	1.24	0	0	0	0
14.9	53.0	4.17	7.66	0.85	4.88	3000	4.56	3000
15.0	53.0	4.29	7.88	0.87	4.86	3500	4.54	3500
15.0	56.2	4.20	9.69	1.12	4.85	3000	5.00	3000
15.1	178.3	2.56	2.98	2.26	0	0	0	0
15.2	58.7	4.11	7.37	1.06	4.78	2700	4.56	2700
19.8	68.1	4.12	8.65	-0.16	4.40	2400	4.15	2400
19.9	60.9	4.34	9.31	-0.45	4.24	3400	4.49	3400

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
19.9	76.4	3.95	8.18	-0.11	4.02	1800	4.38	1800
20.0	58.4	4.36	9.59	-0.67	4.24	3800	4.54	3800
20.1	65.6	4.29	9.09	-0.32	4.38	2800	4.11	2800
20.1	200.3	2.74	5.06	0.52	0	0	0	0
24.8	69.5	4.09	9.02	-0.65	4.02	2800	4.22	2800
24.9	64.9	4.34	9.81	-0.95	4.06	3500	4.20	3400
25.0	63.0	4.34	10.05	-1.21	4.05	3800	4.27	3800
25.1	63.6	4.26	9.72	-1.04	4.06	3200	4.26	3200
29.7	64.5	4.31	10.42	-1.60	3.95	3600	4.08	3600
29.9	80.7	3.92	9.28	-1.31	3.90	2800	4.13	2800
29.9	62.9	4.34	10.45	-1.59	3.94	4000	4.12	4000
30.0	70.1	3.53	9.89	-1.66	3.93	3200	4.15	3200
34.7	73.6	4.17	10.57	-2.07	3.89	4000	3.99	4000
34.7	74.9	4.03	10.17	-1.96	3.84	3200	4.03	3200
34.7	98.2	3.56	8.99	-1.60	3.80	2500	4.02	2500
34.8	70.9	4.05	10.29	-2.03	3.88	3600	3.98	3600
Static Trim = 0 deg, Displacement = 784 lbs, Water Density = 1.967, Kinematic Viscosity = 1.275								
5.0	17.3	----	-0.37	0.09	0	0	0	0
5.0	25.7	0.93	2.07	-0.17	2.92	50	3.22	500
5.1	25.9	1.11	2.44	-0.17	2.94	50	3.32	500
5.1	25.7	1.21	2.64	-0.17	2.95	50	3.36	700
10.0	109.5	----	-0.57	1.23	0	0	0	0
10.0	70.7	2.20	3.78	0.71	2.87	75	3.04	100
10.0	66.7	2.29	4.31	0.37	3.44	250	3.82	400

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
10.1	67.9	2.29	4.05	0.60	3.16	175	3.45	200
10.1	67.9	2.31	4.13	0.58	3.28	200	3.58	300
10.2	66.7	2.38	4.26	0.59	3.59	300	3.97	800
14.9	79.6	3.59	5.87	1.48	3.20	600	3.49	300
15.0	76.1	3.74	6.22	1.43	3.34	800	3.58	500
15.0	150.9	2.66	3.48	1.94	0	0	0	0
15.1	59.0	4.53	8.59	0.67	3.49	1600	3.75	1600
15.2	57.4	4.63	8.42	1.04	3.61	2200	3.78	2200
15.2	56.9	4.71	8.70	0.92	3.67	2500	3.82	2500
15.2	72.4	4.46	7.95	1.16	3.40	1200	3.71	1200
15.2	74.7	3.88	6.65	1.27	3.40	1000	3.65	800
19.7	61.4	4.71	10.77	-1.13	3.62	3600	3.81	3600
20.0	147.6	2.36	4.76	0.06	0	0	0	0
20.0	59.1	4.46	10.27	-1.15	3.62	2500	3.89	2500
20.0	59.8	4.80	10.89	-1.09	3.61	3800	3.78	3800
20.0	64.2	4.37	9.90	-0.96	3.58	2000	3.82	2200
20.0	66.5	4.25	9.31	-0.77	3.56	1700	3.79	1800
20.0	69.4	3.64	8.11	-0.70	3.54	1500	3.78	1500
20.0	109.1	3.13	6.40	0	2.58	600	2.74	400
20.0	127.1	2.85	5.83	0	2.23	400	2.89	200
20.1	57.4	4.65	10.38	-0.89	3.64	3200	3.86	3200
20.1	77.7	3.74	7.99	-0.28	3.40	1500	3.71	1100
20.2	94.4	3.39	7.05	-0.12	3.21	900	3.39	600
20.2	56.6	4.56	10.56	-1.23	3.66	2800	3.89	2800
24.6	70.3	4.55	10.65	-1.39	3.59	2600	3.62	2600
24.8	74.8	4.08	9.33	-1.00	3.42	1800	3.72	1600

TABLE 1 - Continued

Speed fps	Resistance lbs	δ_T deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
24.8	136.4	3.27	7.08	-0.61	2.01	600	2.12	400
24.9	69.9	3.88	10.20	-1.28	3.51	2000	3.78	2000
24.9	69.5	4.52	10.51	-1.28	3.48	2800	3.70	2400
24.9	83.8	3.78	8.53	-0.81	3.39	1000	3.68	1000
24.9	70.3	4.65	10.78	-1.28	3.59	3800	3.64	3600
25.0	167.3	3.21	6.66	-0.09	0	0	0	0
29.7	72.6	4.25	10.42	-1.74	3.46	3000	3.48	3000
29.7	73.0	4.38	10.76	-1.85	3.48	4000	3.55	4000
29.8	76.1	4.06	10.06	-1.76	3.43	2000	3.69	2000
29.9	81.1	3.93	9.78	-1.74	3.43	1600	3.68	1600
29.9	74.4	4.15	10.41	-1.93	3.48	2700	3.48	2700
30.0	71.8	4.30	10.50	-1.73	3.48	3400	3.48	3400
30.0	79.5	4.05	10.20	-1.93	3.46	1900	3.71	1900
34.5	75.4	4.05	10.56	-2.32	3.56	4000	3.59	4000
34.9	79.3	3.90	10.33	-2.37	3.45	3500	3.66	3500
34.9	75.8	3.95	10.41	-2.34	3.46	3900	3.66	3900
34.9	78.6	3.91	10.32	-2.35	3.47	3200	3.68	3000
35.0	82.8	3.74	10.03	-2.38	3.40	2400	3.64	2400
35.0	83.0	3.84	10.27	-2.41	3.42	2800	3.68	2800
Static Trim = 1.0 deg, Displacement = 784 lbs, Water Density = 1.967, Kinematic Viscosity = 1.275								
5.4	26.0	1.11	1.93	0.33	2.28	100	2.36	50
5.4	27.3	1.05	1.54	0.55	2.55	200	2.63	100
5.4	27.3	1.91	3.38	0.50	2.64	300	2.75	125
5.6	19.3	0	-0.39	0.29	0	0	0	0

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
10.1	61.4	3.95	7.19	0.90	2.68	200	2.54	800
10.1	57.9	4.40	8.42	0.55	2.88	1200	3.14	1200
10.2	85.3	1.26	0.75	1.76	0	0	0	0
10.2	72.1	2.26	3.03	1.60	1.40	100	1.44	50
10.2	62.4	3.86	6.88	1.00	2.65	200	3.04	100
10.2	58.5	3.98	7.29	0.85	2.82	800	2.92	200
10.2	54.3	4.03	7.68	0.55	2.77	200	3.09	400
15.0	60.5	4.63	9.67	-0.20	3.00	2400	3.37	2400
15.0	60.8	4.72	9.83	-0.20	3.02	3200	3.39	3200
15.0	95.6	2.79	5.22	0.50	1.31	300	1.36	100
15.1	62.3	4.51	9.26	0	2.98	1100	3.32	800
15.1	60.5	4.60	9.37	0	2.98	1800	3.34	1600
15.2	58.3	4.50	9.14	0	3.04	1500	3.39	1500
15.2	68.5	3.94	7.56	0.50	2.86	500	3.02	200
15.5	103.5	3.20	4.67	1.86	0	0	0	0
19.9	104.9	3.33	7.20	-0.40	1.72	400	1.82	200
19.9	63.1	4.25	10.42	-1.75	3.28	4000	3.06	4000
20.0	65.9	4.00	9.99	-1.80	2.94	1800	3.23	1600
20.0	62.9	4.15	10.33	-1.85	3.26	3000	3.06	2700
20.0	64.9	4.03	10.14	-1.90	2.92	2000	3.30	1800
20.0	69.9	3.84	9.45	-1.60	2.92	1100	3.22	600
20.0	67.1	3.95	9.77	-1.70	2.94	1800	3.29	1200
20.0	64.6	4.13	10.15	-1.70	2.94	2400	3.31	2400
20.3	68.7	3.98	9.73	-1.60	2.96	1100	3.32	600
20.4	117.3	2.74	6.95	-0.36	0	0	0	0
24.8	69.6	3.80	9.84	-2.06	3.36	4000	2.83	4000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
24.9	71.7	3.80	9.72	-1.98	3.36	3200	2.88	3200
25.0	75.3	3.56	9.17	-1.88	3.32	1400	2.94	1800
25.0	78.3	3.53	9.01	-1.80	2.91	1000	3.22	500
25.1	78.4	3.48	8.91	-1.80	2.84	1000	3.23	800
25.1	76.2	3.55	9.28	-2.00	2.76	1800	3.38	1600
25.1	115.2	3.05	7.64	-1.40	2.06	400	2.16	250
25.3	144.7	3.02	7.09	-0.92	0	0	0	0
29.7	79.0	3.44	9.65	-2.61	3.48	4000	2.64	4000
29.8	81.6	3.46	9.76	-2.73	3.50	3500	2.64	3500
29.9	86.6	3.31	9.39	-2.64	3.52	2500	2.54	3000
30.0	144.5	2.56	7.09	-1.76	0	0	0	0
30.0	89.3	3.30	9.16	-2.40	2.44	2000	3.44	1600
30.0	90.2	3.41	9.46	-2.50	2.50	1800	3.44	1000
30.0	82.8	3.50	9.78	-2.60	2.48	3100	3.55	2600
30.0	86.4	3.58	9.82	-2.50	2.46	2000	3.54	2000
30.2	90.9	3.37	9.19	-2.30	2.52	1600	3.41	1000
34.5	84.8	3.12	9.43	-3.07	3.50	4000	2.58	4000
35.0	89.0	3.04	9.37	-3.16	2.43	2800	2.52	2000
35.0	90.8	3.03	9.16	-2.99	2.49	3000	3.44	2500
35.0	94.7	2.39	7.95	-3.07	2.60	1800	3.36	1500
35.1	95.5	2.90	8.97	-3.05	2.53	2000	3.45	1600
Static Trim = -0.5 deg, Displacement = 1458 lbs, Water Density = 1.967, Kinematic Viscosity = 1.189								
24.4	146.1	6.35	14.02	-1.06	6.98	3800	7.38	3200
34.8	159.1	5.15	13.85	-3.34	6.60	4000	6.92	3500

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0 deg, Displacement = 1458 lbs, Water Density = 1.966, Kinematic Viscosity = 1.173								
5.0	24.3	0	-0.71	0.36	0	0	0	0
10.0	164.9	0	-1.00	2.03	0	0	0	0
15.1	176.6	6.80	11.70	2.16	7.79	2500	8.67	2200
20.2	155.5	6.85	14.64	-0.70	6.76	2500	7.48	2500
25.0	149.8	5.90	13.29	-1.28	6.54	1800	6.97	1700
25.0	146.0	6.18	13.93	-1.33	6.48	2800	7.34	2800
25.1	149.2	6.05	13.70	-1.33	6.44	2000	7.24	2000
29.7	159.6	5.37	13.14	-2.21	6.20	1800	6.76	1400
30.0	157.5	5.38	13.36	-2.39	6.23	2000	6.68	1200
30.1	151.0	5.48	13.75	2.56	6.20	3000	6.94	3000
34.6	167.5	4.75	13.10	-3.41	5.98	2000	6.34	1000
34.8	157.6	4.85	13.36	-3.43	6.22	3000	6.94	3000
35.3	157.5	4.84	13.27	-3.39	6.15	2600	6.88	2600
Static Trim = 1.0 deg, Displacement = 1458 lbs, Water Density = 1.966, Kinematic Viscosity = 1.173								
5.1	21.8	0	-0.91	0.47	0	0	0	0
5.1	34.0	0	-0.21	0.59	4.01	10	4.07	10
5.1	44.7	1.04	1.83	0.39	0.15	100	0.30	50
10.1	165.3	0.70	-0.74	2.29	0	0	0	0
15.3	180.1	6.60	11.56	1.92	6.39	1500	6.60	1600
19.8	172.9	5.75	13.31	-1.54	5.90	1000	6.32	1600
20.0	172.6	5.80	13.39	-1.53	6.06	1000	6.27	1800
20.0	159.5	6.10	14.15	-1.73	6.39	3200	6.39	3200

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
21.0	178.0	5.75	13.39	-1.63	5.36	1000	6.02	800
24.9	190.2	5.21	12.95	-2.29	5.36	1500	5.38	1800
25.0	211.7	5.23	12.63	-1.94	4.46	1100	4.47	1300
25.0	173.6	5.50	12.79	-1.54	5.96	2000	5.94	2200
25.0	162.8	5.21	13.10	-2.43	6.16	3000	6.18	3000
25.0	176.2	5.25	12.96	-2.25	5.93	2500	5.86	2500
29.3	164.0	4.60	12.88	-3.52	5.84	3800	6.02	3500
29.5	173.5	4.49	12.54	-3.38	5.94	1800	5.83	2200
29.5	210.3	4.50	12.49	-3.26	4.48	1200	4.44	1500
29.7	161.3	4.52	12.67	-3.45	6.00	2800	5.90	2800
30.0	193.4	4.42	12.38	-3.34	5.02	1700	5.06	1800
34.2	165.4	3.96	12.43	-4.40	6.16	3500	5.58	3500
34.5	210.7	4.27	12.94	-4.20	4.42	1000	4.72	1200
34.7	163.7	3.88	12.34	-4.46	5.84	2400	5.54	2800
34.8	175.0	3.85	12.27	-4.43	5.80	1800	5.60	2200
			MODEL 4984, LENGTH/BEAM RATIO = 5.5					
Static Trim = 0 deg, Displacement = 365 lbs, Water Density = 1.968, Kinematic Viscosity = 1.371								
10.0	20.3	2.98	7.8	-0.7	1.62	5000	0.96	4000
10.1	33.4	0.45	0.3	0.8	0	0	0	0
10.2	19.6	2.80	7.1	-0.4	1.56	1500	0.90	1000
10.3	19.9	2.93	7.5	-0.5	1.58	3000	0.90	2000
10.3	19.8	2.93	7.6	-0.6	1.60	4000	0.94	3000
15.3	23.8	2.73	7.7	-1.2	1.64	3600	1.00	3400

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.3	54.4	0.43	2.0	0.8	0	0	0	0
15.5	22.8	2.68	7.5	-1.1	1.61	2900	2.07	2500
16.0	24.8	2.55	7.1	-1.0	1.56	1500	----	1000
20.1	75.0	1.15	2.7	0	0	0	0	0
20.2	32.8	2.68	7.7	-1.3	1.55	3000	1.00	2700
20.6	33.5	2.65	7.3	-1.1	1.53	2000	0.94	1800
20.7	35.8	2.55	7.1	-1.0	1.52	1250	0.88	1000
25.0	48.1	2.48	7.0	-1.1	1.48	3000	0.75	2500
25.2	92.0	1.35	3.6	-0.4	0	0	0	0
25.3	47.5	2.48	7.4	-1.5	1.49	2200	0.96	2000
25.4	50.7	2.72	7.0	-1.1	1.46	1500	0.78	1000
30.0	61.2	2.48	7.4	-1.5	1.44	3000	0.86	2300
30.0	64.0	2.39	7.0	-1.3	1.40	1500	1.18	1000
30.0	62.3	2.39	7.1	-1.4	1.42	2200	0.98	2000
30.3	153.8	1.30	4.1	-1.0	0	0	0	0
33.8	71.9	2.48	7.0	-1.3	1.40	1500	3.18	1000
33.9	68.2	2.52	7.5	-1.5	1.44	3000	5.36	2000
34.4	68.0	2.43	7.3	-1.5	1.45	3500	3.99	3000
Static Trim = 1.0 deg, Displacement = 365 lbs, Water Density = 1.968, Kinematic Viscosity = 1.371								
10.1	24.4	2.80	6.0	0.7	0.94	1500	0.27	1000
10.3	23.6	2.93	6.4	0.6	1.03	2700	0.27	2000
10.3	24.2	3.02	6.7	0.5	1.02	3600	0.25	3000
10.3	23.7	3.10	7.0	0.4	1.06	5000	0.27	4000
15.2	32.6	2.52	6.0	0	0.80	1500	0.40	1000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.2	32.1	2.65	6.4	-0.1	0.90	2500	0.44	2000
15.3	31.7	2.73	6.7	-0.2	0.94	3800	0.48	3000
20.1	51.8	2.23	6.6	-1.3	0.86	1800	1.82	1500
20.1	50.2	2.19	6.4	-1.2	0.90	1800	0.43	2000
20.1	49.8	2.28	6.9	-1.5	0.95	4000	0.47	3000
20.2	57.6	2.10	6.0	-1.0	0.76	1300	0.34	1000
25.2	60.2	1.93	6.0	-1.6	0.98	1500	0.48	1000
25.4	53.8	1.93	6.6	-2.0	1.10	4000	0.62	3000
25.8	56.7	2.02	6.3	-1.8	1.06	2500	0.54	2000
30.3	68.0	1.68	6.5	-2.5	1.02	2000	1.64	1500
30.9	69.0	1.68	6.0	-2.0	0.48	1500	2.50	1000
30.9	66.0	1.77	6.4	-2.2	1.06	3000	3.86	2000
31.0	61.6	1.77	6.7	-2.5	1.08	4000	3.52	3000
33.0	72.5	1.65	6.4	-2.5	1.04	3000	0.51	2000
33.2	76.1	1.52	5.8	-2.2	0.96	1200	0.92	1000
Static Trim = 0 deg, Displacement = 710 lbs, Water Density = 1.968, Kinematic Viscosity = 1.312								
10.2	38.5	2.93	7.0	-0.2	3.21	1750	1.90	1500
10.2	37.5	2.93	7.1	-0.2	3.23	2000	1.92	1800
10.2	37.3	2.93	7.1	-0.2	3.22	2000	2.02	1750
10.3	42.8	2.93	7.1	-0.2	3.06	2000	1.87	1000
11.0	40.3	2.80	7.0	-0.3	3.11	200	2.24	1000
15.0	36.8	3.27	8.3	-0.5	3.28	3000	2.07	2300
15.0	43.3	3.05	7.5	-0.2	3.18	1600	1.98	1100
15.0	50.7	2.70	6.5	-0.1	3.10	1100	1.88	300

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
15.1	121.4	1.83	2.6	1.8	0	0	0	0
15.3	40.2	3.10	7.7	-0.3	3.28	2000	1.97	1800
15.7	42.2	2.55	6.7	-0.6	3.26	2000	2.02	1800
20.2	52.8	3.50	9.0	-0.7	3.12	2100	2.00	2000
20.2	141.0	1.83	4.1	0.3	0	0	0	0
20.3	52.3	3.50	9.3	-1.0	3.17	3100	2.06	3000
20.3	63.3	3.15	8.0	-0.5	3.12	1000	2.06	900
20.3	81.5	2.75	6.5	0	2.64	1000	1.50	550
20.3	56.1	3.56	9.5	-1.0	3.22	2000	1.99	1800
25.1	74.9	3.38	8.6	-0.6	3.06	1700	1.89	1000
25.2	71.9	3.38	8.8	-0.8	3.08	2000	2.72	1800
25.2	74.8	3.38	8.6	-0.5	3.07	1900	1.89	1400
25.3	73.0	3.38	8.7	-0.6	3.07	2000	1.87	1800
25.4	71.7	3.38	8.9	-0.8	3.05	3000	2.76	2800
25.5	169.1	2.30	5.4	0.1	0	0	0	0
30.3	88.3	3.22	8.7	-1.0	3.02	2000	2.56	1800
30.3	87.6	3.27	8.8	-1.0	3.22	3000	3.02	2500
30.4	89.7	3.62	8.6	-1.0	3.02	1800	2.70	1500
33.3	96.7	2.98	8.4	-1.3	3.01	2500	1.91	1800
33.7	96.9	3.03	8.5	-1.3	3.12	1700	1.78	1500
34.3	92.6	3.10	8.7	-1.3	3.04	3000	1.84	2500
Static Trim = 1.0 deg, Displacement = 710 lbs, Water Density = 1.968, Kinematic Viscosity = 1.351								
10.1	53.2	3.28	7.0	0.8	2.21	3000	1.58	2400
10.2	54.2	3.35	7.0	1.0	2.12	2000	1.46	1500

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
10.2	53.5	3.35	7.0	1.0	2.20	2800	1.50	2000
10.3	55.5	3.35	7.0	1.0	2.12	1800	1.42	1000
10.3	62.3	1.22	1.2	1.7	0	0	0	0
14.8	92.5	2.28	4.0	1.4	0	0	0	0
15.2	64.6	3.40	7.7	0.4	2.14	3800	1.58	3000
15.3	68.1	3.32	7.2	0.7	2.08	1800	1.38	1000
15.3	66.9	3.35	7.4	0.6	2.07	2300	1.44	2000
20.1	66.0	2.65	6.9	-0.6	2.03	1700	1.17	1000
20.2	61.5	2.80	7.0	-1.3	2.20	3800	1.42	3000
20.2	116.0	2.28	5.4	0	0	0	0	0
20.3	60.7	2.52	7.0	-1.0	2.18	2700	1.36	2000
24.2	77.0	2.52	7.7	-1.7	2.34	4500	1.48	3500
24.9	136.4	2.28	6.2	-0.8	0	0	0	0
25.2	86.2	2.48	7.4	-1.5	2.12	2800	1.29	2000
25.3	102.4	2.48	7.0	-1.1	1.76	1900	1.01	1000
29.9	159.0	2.18	6.5	-1.3	0	0	0	0
30.2	106.7	2.10	7.0	-2.0	2.07	2000	1.24	1000
30.3	92.9	2.15	7.4	-2.3	2.24	3000	1.46	2000
30.3	88.9	2.22	7.6	-2.3	2.40	3500	1.80	3000
32.5	173.0	1.60	6.5	-1.7	0	0	0	0
32.9	102.0	1.38	7.0	-2.5	2.21	2000	1.44	1100
33.0	98.6	1.43	7.1	-2.5	2.22	2800	1.49	2000
33.2	97.8	2.10	7.5	-2.5	2.20	3500	1.51	3000

TABLE 1 - Continued

Speed fps	Resistance lbs	δ_T deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0 deg, Displacement = 1456 lbs, Water Density = 1.967, Kinematic Viscosity = 1.275								
12.6	212.6	2.90	3.4	3.5	2.37	55	2.46	55
12.8	140.6	3.48	7.3	1.0	6.24	85	6.78	85
12.8	180.2	1.47	6.1	-2.6	5.23	55	5.68	55
12.9	234.9	1.85	2.2	2.2	0	0	0	0
12.9	229.3	2.31	2.7	2.8	0.97	55	0.74	55
13.0	207.0	3.85	5.2	4.0	3.82	55	3.62	55
13.0	188.5	4.02	6.0	3.6	4.81	65	4.80	65
13.0	183.0	3.65	6.0	2.7	4.92	70	4.98	70
13.0	158.7	3.98	7.0	2.5	6.50	160	6.60	160
13.1	196.0	3.73	5.0	3.9	4.31	60	4.20	60
13.1	177.0	3.77	6.5	2.5	5.54	80	5.68	80
13.2	157.7	3.52	6.8	1.6	6.86	200	6.90	200
13.2	155.1	4.10	7.8	2.0	8.02	1000	7.74	1000
13.5	141.0	----	---	---	----	1000	----	1000
20.2	293.9	3.67	8.3	0.3	5.14	30	5.54	30
20.3	285.3	3.48	8.1	0.2	3.76	30	3.70	30
20.3	287.4	----	---	---	4.12	40	4.28	40
20.3	275.9	----	---	---	4.82	45	5.10	45
20.3	281.0	3.52	8.2	0.2	5.22	35	5.58	35
20.3	279.2	3.48	8.7	-0.4	6.12	35	6.56	35
20.3	279.1	3.52	8.7	-0.3	6.48	35	6.78	35
20.3	277.1	3.43	8.7	-0.5	7.32	30	7.64	30
20.3	279.0	3.28	7.8	0	6.12	40	6.55	40
20.3	282.6	3.32	7.9	0	5.88	40	6.32	40

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.4	281.8	3.23	7.7	0	7.62	40	8.13	40
20.4	272.6	3.32	7.9	0	9.18	70	9.80	70
20.4	292.8	3.56	7.8	0.7	0	0	0	0
20.5	281.7	3.65	8.7	0	3.97	35	1.65	35
20.6	266.9	3.67	8.5	0.1	6.24	30	6.70	30
20.6	278.6	3.48	8.2	0.1	8.40	45	8.11	45
20.6	274.8	3.70	8.7	0.1	8.22	40	8.60	40
20.6	290.5	3.37	8.0	0	0	0	0	0
20.7	290.2	3.65	8.4	0.3	0	0	0	0
20.7	154.4	5.40	14.0	-1.1	7.94	3000	4.54	3000
20.7	155.4	4.98	12.9	-1.0	7.70	3000	3.70	3000
25.2	155.9	5.56	13.0	0.3	7.18	3500	4.06	3500
25.2	262.0	4.40	9.4	1.1	0	0	0	0
25.3	152.5	5.32	12.7	0	7.20	3000	4.50	3000
25.3	154.7	5.62	13.4	0	7.22	5000	4.29	5000
29.7	176.8	4.70	12.0	1.0	6.13	800	6.89	800
30.1	172.3	5.12	13.0	-0.8	7.02	2500	4.05	2500
30.1	158.0	5.15	13.4	-1.1	7.00	5500	3.92	5500
30.4	163.0	5.20	13.0	-0.6	7.10	3500	5.12	3500
30.4	161.0	5.03	13.0	-1.0	7.02	4000	4.03	4000
33.1	179.1	5.12	13.5	-1.2	6.85	3500	4.04	3500
33.1	165.8	4.90	13.3	-1.6	6.95	5500	4.04	5500

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 1.0 deg, Displacement = 1456 lbs, Water Density = 1.967, Kinematic Viscosity = 1.275								
10.3	243.7	4.20	9.0	1.0	5.0[illegible]	3000	3.00	3000
13.4	138.7	4.86	10.3	1.3	6.22	2800	6.16	2800
20.3	137.7	4.40	12.5	-2.0	6.17	4000	3.70	4000
20.3	141.9	4.70	12.2	-1.0	6.08	2500	3.65	2500
20.4	140.3	4.40	12.2	-1.7	6.11	3000	3.52	3000
24.9	182.6	4.45	11.3	-0.7	4.70	3000	2.66	3000
24.9	198.8	4.37	11.4	-1.0	4.47	3200	2.46	3200
25.1	178.5	4.45	11.6	-1.0	5.58	3660	3.41	3660
25.1	203.7	4.37	11.4	-1.0	4.72	2600	3.50	2600
25.2	197.6	4.45	11.6	-1.0	5.16	3100	2.80	3100
25.3	219.4	4.40	11.5	-1.0	2.74	2000	1.52	2000
25.4	171.0	4.73	12.7	-1.4	5.74	4800	3.48	4800
25.4	211.5	4.40	11.5	-1.0	3.88	2600	2.00	2600
25.6	202.9	4.40	11.5	-1.0	4.64	3200	2.70	3200
30.2	257.0	4.20	12.0	-2.0	1.28	2000	0.78	2000
30.2	233.7	4.23	11.9	-1.8	2.76	4000	1.42	4000
30.3	216.8	4.12	12.0	-2.2	4.72	3500	2.92	3500
30.4	246.8	4.12	11.6	-1.8	1.36	2500	0.65	2500
30.6	225.0	4.15	11.8	-1.9	3.99	5000	2.78	5000
33.0	263.6	3.82	11.8	-2.7	1.84	4000	0.84	4000
33.1	272.4	3.78	11.5	-2.5	0.70	2000	0.36	2000
33.3	263.5	3.98	12.1	-2.6	1.14	3000	0.60	3000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 0 deg, Displacement = 2160 lbs, Water Density = 1.968, Kinematic Viscosity = 1.312								
15.3	315.3	5.90	11.5	2.5	13.29	4500	13.91	3000
20.1	288.2	6.45	16.5	-1.1	8.86	2200	7.84	2000
20.2	289.4	6.05	16.0	-1.5	9.02	3000	7.31	2000
20.7	341.7	6.10	15.8	-1.2	8.41	200	6.76	200
25.3	342.5	5.95	14.7	-0.5	5.94	5000	5.23	4000
25.3	353.4	5.95	14.7	-0.5	3.88	2400	3.21	1800
25.4	351.1	3.95	10.0	-0.6	4.03	4000	3.15	3000
30.1	408.5	5.56	15.5	-2.2	0.43	3200	0.18	3000
30.1	399.4	5.56	15.5	-2.2	0.33	1400	0.18	800
30.1	398.2	2.77	8.6	-2.0	1.20	3500	1.21	3000
30.3	407.0	3.65	10.5	-1.8	0.68	2800	1.20	2000
33.0	407.6	5.35	16.0	-3.2	0.42	2600	0.18	2000
33.1	403.3	5.65	15.5	-3.0	1.11	4500	0.76	3500
Static Trim = 1.0 deg, Displacement = 2160 lbs, Water Density = 1.967, Kinematic Viscosity = 1.275								
5.6	37.5	0.15	0	0.4	3.13	0	2.31	0
10.5	222.3	1.53	1.4	2.3	3.32	0	2.48	0
15.2	390.3	4.22	3.5	4.6	3.13	0	2.32	0
15.6	372.1	5.34	8.5	4.3	8.56	100	7.96	140
15.9	372.2	5.15	8.7	3.8	10.28	160	10.06	140
19.9	269.7	6.03	16.5	-2.0	8.48	800	7.88	1200
19.9	302.9	5.70	14.8	-1.1	6.98	100	6.72	70
20.2	270.9	5.94	16.0	-1.9	9.39	6000	8.64	5000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.2	274.8	6.15	16.5	-1.8	9.04	3000	8.14	3400
25.0	373.8	5.95	15.0	-0.8	1.10	1500	0.76	1200
25.1	363.8	6.01	15.7	-0.8	3.88	3500	2.96	3000
25.1	344.9	6.01	15.1	-0.7	4.65	5000	3.80	4000
25.2	381.0	5.97	15.0	-0.7	1.28	2000	0.94	1800
25.3	378.1	6.01	15.0	-0.6	2.25	2400	1.60	2000
30.5	406.4	6.19	17.5	-2.7	0.35	3000	0.27	2000
33.5	418.9	5.30	16.1	-3.5	0.38	2000	0.12	1800

MODEL 4985, LENGTH/BEAM RATIO = 7.0

Static Trim = -0.5 deg, Displacement = 783 lbs, Water Density = 1.972, Kinematic Viscosity = 1.374

5.0	15.8	0.23	-0.52	0.36	0	0	0	0
10.0	75.6	0	-0.72	0.73	0	0	0	0
15.1	46.4	3.10	9.59	-3.20	4.00	5000	3.90	3500
15.1	56.2	2.25	6.90	----	3.63	1200	3.22	600
15.2	132.5	1.73	3.70	-0.11	0	0	0	0
15.2	59.4	2.62	7.19	-1.82	3.72	2000	3.49	1000
20.1	177.8	1.13	3.69	-1.35	0	0	0	0
20.1	54.8	2.78	8.59	-2.86	3.78	4000	3.90	2800
20.1	64.4	2.50	7.63	-2.48	3.92	2800	3.98	1800
20.2	76.7	2.33	6.71	-1.92	3.89	2000	3.81	1000
20.2	49.1	2.92	9.34	-3.33	4.00	5000	3.92	4000
25.1	284.0	1.45	3.09	-0.12	0	0	0	0
25.1	94.8	2.99	8.11	-1.97	3.83	3000	3.55	2000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
25.2	66.1	3.52	10.08	-2.84	3.78	6000	3.60	4500
29.7	363.8	1.82	3.98	-0.26	0	0	0	0
29.9	123.1	3.08	10.00	-2.22	3.63	3000	3.36	2500
30.2	95.8	3.45	10.00	-2.88	3.38	6000	3.48	5800
34.8	107.9	3.42	10.27	-3.24	3.48	6000	3.22	5500
34.9	178.2	2.84	8.59	-2.76	2.90	3500	2.62	2500
Static Trim = 0 deg, Displacement = 783 lbs, Water Density = 1.970, Kinematic Viscosity = 1.314								
5.0	15.7	----	-0.42	0.36	0	0	0	0
5.1	20.7	1.73	4.90	-1.31	3.17	1000	3.02	900
5.1	20.5	1.72	4.80	-1.26	3.18	500	3.06	1000
10.0	72.4	----	-0.16	0.65	0	0	0	0
10.0	46.1	2.25	5.95	-1.30	3.20	250	3.22	600
10.1	44.7	2.53	6.83	-1.62	3.38	800	3.27	1000
15.1	113.2	1.54	3.38	-0.21	0	0	0	0
15.1	46.9	3.12	9.72	-2.30	3.79	6000	3.42	5500
15.1	48.4	2.62	8.95	-2.57	3.53	1500	2.81	2200
15.1	48.7	3.01	9.44	-3.25	3.47	1500	2.77	1100
15.1	48.8	3.09	9.09	-2.74	3.52	900	3.03	700
15.1	48.5	3.09	9.08	-2.71	3.55	3000	3.13	2200
20.0	174.5	1.22	3.21	-0.71	0	0	0	0
20.1	49.4	2.85	9.05	-3.19	3.56	2500	2.90	1800
20.2	49.6	2.99	9.48	-3.35	3.59	6000	2.78	6000
20.2	50.0	2.98	9.37	-3.25	3.52	3000	2.62	2000
20.2	53.0	2.94	9.31	-3.27	3.48	1000	2.73	1000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
25.0	139.2	2.53	6.73	-1.53	2.84	1200	2.66	800
25.1	70.0	3.38	10.06	-3.11	3.42	6000	3.42	5000
25.1	71.1	3.34	9.88	-3.04	3.48	2500	2.72	2000
25.1	68.8	3.42	9.94	-2.90	3.32	5000	2.61	4000
25.2	250.2	1.48	3.37	-0.33	0	0	0	0
25.2	74.1	3.45	9.59	-2.49	3.37	1500	2.70	1200
30.0	88.7	3.28	10.02	-3.18	3.36	6000	2.66	6000
30.0	94.0	3.20	9.71	-3.11	3.42	3800	2.54	3500
34.4	113.0	2.94	9.46	-3.43	3.30	2500	2.88	2000
34.6	113.0	3.12	9.67	-3.25	3.12	6000	2.84	5500
34.8	118.4	2.95	9.30	-3.23	3.05	3500	2.66	3000
34.8	108.0	3.05	9.71	-3.41	3.29	4000	3.12	3000
34.9	95.4	3.16	9.55	-3.03	3.30	1500	3.26	1000
34.9	228.5	3.00	7.31	-1.15	1.32	800	4.40	500
35.1	93.1	3.11	9.58	-3.03	3.38	2500	2.80	2000
Static Trim = 1.0 deg, Displacement = 783 lbs, Water Density = 1.970, Kinematic Viscosity = 1.373								
5.2	17.6	0.05	-0.19	0.28	0	0	0	0
10.0	66.5	0.75	0.76	0.80	0	0	0	0
15.0	95.3	1.70	4.01	-0.50	0	0	0	0
15.0	73.4	3.22	9.34	-2.73	2.24	4000	1.80	3000
15.1	74.7	3.20	8.83	-2.23	2.24	2000	1.80	1600
15.1	75.9	3.18	8.58	-2.03	2.24	1000	1.82	1000
15.1	76.1	3.13	8.37	-1.92	2.24	700	1.82	600
20.1	128.0	1.58	4.62	-1.35	0	0	0	0

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.1	75.9	2.50	8.21	-3.06	2.38	3000	2.37	2200
20.1	81.9	2.58	7.89	-2.58	2.37	1600	2.04	1200
20.1	79.1	2.58	7.89	-2.59	2.46	800	2.16	1000
20.2	73.5	2.62	8.68	-3.30	2.46	6000	2.38	5500
25.2	95.5	2.35	7.85	-3.00	2.47	2000	1.99	1600
25.2	97.1	2.38	7.66	-2.75	2.44	1600	2.11	1000
25.2	101.9	2.35	7.62	-2.78	2.41	800	2.11	1000
25.2	158.4	2.22	5.71	-1.74	0	0	0	0
25.3	91.4	2.42	8.27	-3.31	2.56	4000	2.10	3000
29.7	106.3	2.28	8.30	-3.61	2.62	4000	2.23	3000
29.9	114.3	2.28	7.71	-3.22	2.44	1200	3.93	1000
29.9	116.8	2.13	7.59	-3.20	2.38	500	4.44	800
29.9	185.0	1.88	6.43	-2.55	0	0	0	0
30.0	111.3	2.18	7.90	-3.38	2.53	2000	2.19	1800
34.7	123.1	2.07	8.12	-3.88	2.62	4000	2.16	3000
34.7	126.9	1.97	7.84	-3.75	2.46	2000	2.35	1600
34.8	131.4	1.92	7.71	-3.78	2.42	1500	2.17	1200
Static Trim = -0.5 deg, Displacement = 1000 lbs, Water Density = 1.969, Kinematic Viscosity = 1.277								
5.2	17.4	0.05	-0.31	0.21	0	0	0	0
10.1	90.9	0.35	-0.72	0.78	0	0	0	0
15.2	169.3	1.78	3.74	-0.05	0	0	0	0
20.0	74.3	2.45	7.93	-2.89	6.08	3000	5.77	2000
20.1	209.4	2.87	4.54	1.35	0	0	0	0
20.1	59.7	2.93	9.37	-3.35	5.66	5000	5.74	4000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.1	76.2	2.48	7.56	-2.46	6.02	2500	5.80	1800
20.1	68.5	2.48	8.01	-2.90	6.15	3500	5.86	3000
25.1	278.1	1.97	4.48	-0.42	10.48	200	9.88	50
25.1	82.4	3.47	9.80	-2.80	5.04	6000	5.16	5000
25.2	301.1	1.87	4.04	-0.19	0	0	0	0
29.9	103.1	3.32	9.83	-2.99	4.84	6000	4.72	5000
30.0	103.4	3.83	10.19	-2.99	4.75	6000	4.62	5000
Static Trim = 0 deg, Displacement = 1000 lbs, Water Density = 1.971, Kinematic Viscosity = 1.280								
5.4	23.7	----	-0.60	0.41	0	0	0	0
10.0	63.3	2.56	6.70	-1.44	4.13	1100	3.89	1000
10.0	73.1	2.12	4.70	-0.35	3.62	50	3.49	75
10.0	61.3	2.55	6.75	-1.51	4.14	1100	3.95	1000
10.1	66.7	2.11	5.25	-0.93	3.92	200	3.84	500
10.2	65.8	2.24	5.79	-1.19	4.29	1000	3.68	1100
10.2	106.6	----	-0.26	0.79	0	0	0	0
10.3	61.4	3.23	5.60	-1.04	4.40	200	4.15	1200
15.1	74.4	2.91	7.61	-1.64	4.28	1800	4.30	700
15.1	47.4	3.31	9.43	-2.61	4.54	3800	4.64	3000
15.3	41.0	3.23	10.04	-3.41	4.51	3000	4.58	2500
15.3	44.4	3.15	9.94	-3.48	4.44	1700	4.46	1500
15.3	48.8	3.28	9.85	-3.11	4.46	2500	4.48	2000
20.1	66.9	3.02	9.31	-3.11	4.30	1000	4.38	1200
20.1	63.8	3.06	9.46	-3.17	4.55	3100	4.60	2500
20.1	99.6	2.49	6.96	-1.85	3.86	700	3.95	600

TABLE 1 -- Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.2	59.6	3.42	10.39	-3.39	4.95	6000	4.76	4500
20.3	224.0	1.59	4.47	-1.20	0	0	0	0
20.3	62.4	3.40	10.23	-3.25	4.74	5500	4.68	4000
20.3	68.0	3.18	9.60	-3.04	4.35	1800	4.43	1500
20.3	62.8	3.11	9.59	-3.22	4.49	2800	4.41	2200
20.4	65.9	3.29	9.88	-3.12	4.39	2500	4.44	1900
25.1	255.6	2.09	5.13	-0.85	0	0	0	0
25.1	86.6	3.73	10.55	-2.90	4.36	2600	4.02	2000
25.1	87.3	3.64	10.50	-3.01	4.38	3000	4.16	2500
25.2	130.1	2.97	7.48	-1.38	3.88	1100	3.80	1000
25.2	84.9	3.71	10.40	-2.78	4.35	3400	4.10	3000
25.3	125.6	2.62	8.53	-2.16	3.49	1800	3.68	1500
25.4	83.6	3.69	10.51	-2.93	4.48	4000	4.59	3000
30.0	159.4	2.97	8.52	-2.42	3.64	2100	3.38	2000
30.0	117.5	2.75	8.67	-2.82	4.24	1800	3.92	1200
30.0	100.9	3.21	9.09	-2.50	4.30	2800	3.88	2000
30.1	106.3	2.97	9.05	-2.94	4.23	5000	3.88	4000
30.1	108.1	2.95	9.13	-3.07	4.30	4000	4.07	3000
30.2	111.6	3.52	10.19	-2.95	4.22	2500	4.00	1900
30.4	271.8	2.39	5.94	-1.03	0	0	0	0
34.9	126.2	3.13	9.89	-3.46	3.81	3000	4.02	2500
35.0	130.6	3.27	10.17	-3.46	4.00	2750	3.82	2500
35.0	127.1	3.42	10.35	-3.32	4.13	2200	3.86	1800
35.1	123.9	3.35	10.35	-3.48	4.41	6000	3.81	4500
35.1	137.8	3.31	10.12	-3.32	3.92	3000	3.61	2100

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 1.0 deg, Displacement = 1000 lbs, Water Density = 1.971, Kinematic Viscosity = 1.280								
5.0	15.5	-0.61	-0.44	0.27	0	0	0	0
5.0	22.8	1.62	3.93	-0.62	3.13	500	2.94	1000
5.3	25.7	1.70	4.03	-0.53	3.07	400	2.88	1000
5.3	26.0	1.36	3.20	-0.42	2.92	100	2.78	200
10.1	82.4	0.69	0.46	0.96	0	0	0	0
10.1	77.3	2.57	6.39	-1.13	3.28	2800	3.04	2000
10.2	72.2	2.64	5.83	-0.43	2.98	150	2.80	150
10.2	77.0	3.04	7.27	-1.02	3.15	1600	3.00	1200
15.0	100.5	2.52	5.44	-0.27	2.04	250	1.85	200
15.1	118.7	1.99	4.59	-0.52	0	0	0	0
15.1	86.6	2.93	8.62	-2.60	3.62	1700	2.80	1800
15.1	90.0	3.15	8.17	-1.70	3.60	4000	2.59	3000
15.1	86.9	3.13	8.73	-2.32	3.56	2800	2.66	2400
15.2	87.8	3.15	8.81	-2.35	3.44	5000	2.68	3500
20.0	72.4	2.80	9.34	-3.59	3.29	5500	3.08	4000
20.0	74.4	2.80	9.25	-3.52	3.32	5000	3.07	3500
20.0	79.9	2.58	8.77	-3.46	3.59	2500	2.94	2000
20.0	79.1	2.67	9.07	-3.58	3.60	1500	3.16	1500
20.1	78.0	2.76	8.74	-3.08	3.52	3500	2.99	2500
20.1	78.6	2.74	9.12	-3.50	3.53	3000	2.99	2500
20.1	81.3	2.80	9.02	-3.28	3.46	2800	3.09	2000
20.2	138.7	1.80	5.03	-1.33	0	0	0	0
20.2	80.9	2.74	8.95	-3.33	3.50	1200	3.08	1200
25.0	94.8	2.76	9.21	-3.56	3.53	6000	3.03	4000

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
25.0	100.6	2.61	8.63	-3.27	3.55	1400	3.10	1400
25.1	100.9	2.58	8.52	-3.23	3.45	500	3.18	1100
25.1	106.7	2.60	8.45	-3.13	3.32	400	3.37	1000
25.2	94.6	2.70	9.00	-3.46	3.59	4500	3.03	3000
25.2	97.7	2.62	8.62	-3.24	3.55	2700	3.24	2200
25.3	188.3	2.73	6.17	-1.58	0	0	0	0
30.0	117.2	2.64	9.34	-3.83	3.50	5800	3.02	4000
30.0	147.0	2.89	8.15	-3.23	3.46	1200	3.65	2500
30.1	217.7	1.93	6.57	-2.53	0	0	0	0
30.2	118.9	2.56	8.89	-3.62	3.50	3800	3.03	3000
30.2	123.9	2.33	8.15	-3.36	3.50	2800	2.93	2200
34.9	141.4	2.35	8.74	-3.91	3.51	4000	2.80	3500
35.0	148.2	2.35	8.88	-4.05	3.44	3300	2.78	2500
35.0	136.1	2.82	9.18	-4.10	3.59	4300	2.93	3500
35.0	135.7	2.60	9.58	-4.22	3.44	6000	2.89	4500
35.1	151.1	2.29	8.55	-3.85	3.12	1200	2.69	1800
35.2	131.1	2.39	9.00	-4.09	3.53	4500	3.05	4000
35.5	152.2	2.21	8.33	-3.79	2.98	1000	2.89	1000
Static Trim = 1.5 deg, Displacement = 1000 lbs, Water Density = 1.969, Kinematic Viscosity = 1.277								
5.1	18.2	----	-0.12	0.24	0	0	0	0
10.1	78.7	0.93	1.06	0.85	0	0	0	0
15.2	116.6	2.15	4.93	-0.52	0	0	0	0
20.2	149.3	1.94	5.67	-1.70	0	0	0	0
20.2	115.0	2.17	7.13	-2.70	2.56	6000	2.29	4000

TABLE 1 - Continued

Speed fps	Resistance lbs	$\delta\tau$ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
20.2	110.4	2.19	7.02	-2.54	2.63	4000	2.33	3000
20.3	112.8	2.10	6.90	-2.58	2.58	2500	2.17	2200
20.3	113.4	2.06	6.72	-2.50	2.59	1500	2.11	1500
25.0	146.5	1.88	6.03	-2.36	2.02	2400	1.63	2000
25.1	142.9	2.60	8.31	-2.95	2.03	4500	1.70	3000
25.1	150.1	2.47	7.59	-2.51	1.82	1500	1.36	1800
25.1	153.1	2.47	7.61	-2.55	1.74	1000	1.25	1400
25.2	135.8	2.05	6.76	-2.88	2.39	5800	2.08	4000
25.2	141.3	2.57	8.37	-3.11	2.16	5000	1.79	4000
25.4	177.9	1.83	5.63	-1.84	0	0	0	0
30.0	163.2	2.18	8.16	-3.67	2.04	6000	1.11	4500
30.0	165.7	2.22	8.20	-3.62	1.89	5500	1.45	4000
30.1	200.7	1.74	6.41	-2.83	0	0	0	0
35.0	227.4	1.80	7.09	-3.39	0	0	0	0
Static Trim = 0 deg, Displacement = 1457 lbs, Water Density = 1.970, Kinematic Viscosity = 1.314								
5.1	20.3	----	-0.40	0.42	0	0	0	0
10.0	120.1	----	-0.43	1.13	0	0	0	0
15.1	243.4	2.80	5.85	0.05	0	0	0	0
15.1	183.3	3.35	7.65	-0.76	3.86	50	3.90	50
20.1	263.0	2.08	6.57	-2.30	0	0	0	0

TABLE 1 - Continued

Speed fps	Resistance lbs	δτ deg	Bow Rise in.	Stern Drop in.	Pressure, Port in. water	Air Velocity, Port fpm	Pressure, Starboard in. water	Air Velocity, Starboard fpm
Static Trim = 1.0 deg, Displacement = 1459 lbs, Water Density = 1.970, Kinematic Viscosity = 1.314								
15.1	165.2	4.05	10.10	-1.75	5.09	1800	5.02	600
15.2	155.3	4.50	12.49	-3.25	5.39	3500	5.45	3000
20.0	127.2	3.24	10.67	-4.01	6.51	4500	5.49	3500
20.0	133.8	3.60	10.93	-3.57	6.07	2500	5.34	2000
25.2	177.1	3.54	10.23	-2.95	5.02	500	4.94	500
25.2	161.5	3.58	10.92	-3.57	5.52	2000	5.17	1800
25.2	163.2	3.53	10.82	-3.55	5.50	1800	5.17	1000
25.3	168.6	3.64	10.96	-3.48	5.28	3500	5.48	2200
30.0	244.5	3.62	10.94	-3.51	5.38	5500	5.35	4000
34.9	235.9	3.24	11.12	-4.45	5.37	6000	4.11	4500

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13. ABSTRACT

Four partial air support (Hydrokeel) vehicles of different length-beam ratio have been tested for resistance at a number of loads, speeds, and trim conditions. All data are presented in nondimensional form for use in comparing hull forms.

The tests showed that the use of an air support system significantly improves the performance of this configuration. Lift-drag ratios greater than ten were obtained for a wide range of conditions. Wetted boundaries were not discernible, nor could planing lift be deduced, due to the complexity of the flow.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Ground Effect Machines						
Hydrokeel						
Captured Air Bubble						
Surface Effect Ships						
Air-Cushioned Vehicle						
Length-Beam Ratio						
Air Support						
Planing						
Lift-Resistance Ratio						
Air Lubrication						

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